SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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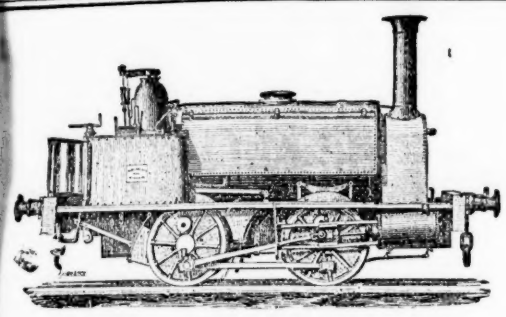
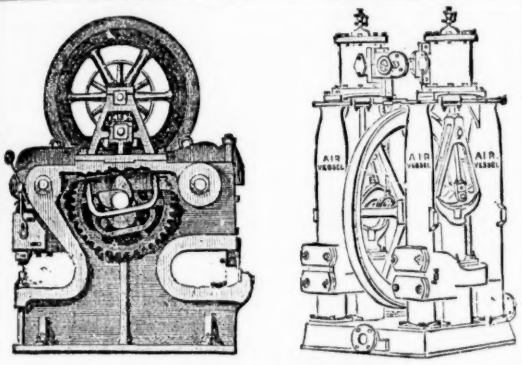
No. 2019.—VOL. XLIV. LONDON, SATURDAY, MAY 2, 1874. PRICE.....FIVEPENCE. PER ANNUM, BY POST, £1 4s.



TANK LOCOMOTIVES,
FOR SALE OR HIRE.
HENRY HUGHES AND CO.
LOUGHBOROUGH.



JOHN CAMERON,
MAKER OF
STEAM PUMPS, PORTABLE ENGINES, PLATE BENDING ROLLERS BAR AND ANGLE IRON SHEARS, PUNCHING AND SHEARING MACHINES, PATENTEE OF THE DOUBLE CAM LEVER PUNCHING MACHINE, BAR SHEARS, AND RAIL PUNCHING MACHINES,
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BICKFORD'S PATENT SAFETY FUSE,
FOR CONVEYING FIRE TO THE
CHARGE IN BLASTING ROCKS, &c.

Obtained the PRIZE MEDALS at the "ROYAL EXHIBITION" of 1851; at the "INTERNATIONAL EXHIBITION" of 1862, in London; at the "IMPERIAL EXPOSITION," held in Paris, in 1855; at the "INTERNATIONAL EXHIBITION," in Dublin, 1865; at the "UNIVERSAL EXPOSITION," in Paris, 1867; the "GREAT INDUSTRIAL EXHIBITION," at Altona, in 1869: and at the UNIVERSAL EXHIBITION," Vienna, in 1873.

BICKFORD, SMITH, AND CO., of TUCKINGMILL, CORNWALL; ADELPHI BANK CHAMBERS, SOUTH JOHN-STREET, LIVERPOOL; and 85, GRACECHURCH-STREET, LONDON, E.C., MANUFACTURERS AND ORIGINAL PATENTEES of SAFETY-FUSE, having been informed that the name of their firm has been attached to fuse not of their manufacture, beg to call the attention of the trade and public to the following announcement:—

EVERY COIL of FUSE MANUFACTURED by them has TWO SEPARATE THREADS PASSING THROUGH the COLUMN of GUNPOWDER, and BICKFORD, SMITH, AND CO. CLAIM TWO SUCH SEPARATE THREADS as their TRADE MARK.

For Excellence and Practical Success of Engines

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ENGINEERS AND GENERAL MERCHANTS,
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IN FIRST-RATE CONDITION, AT MODERATE PRICES.
PUMPING ENGINES; WINDING ENGINES; STAMPING ENGINES STEAM CAPSTANS; and CRUSHERS of various sizes. BOILERS, PIT WORK of all descriptions, and all kinds of MATERIALS required for MINING PURPOSES.

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OSLER'S CRYSTAL GLASS CHANDELIERS,
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SIXTY MACHINES
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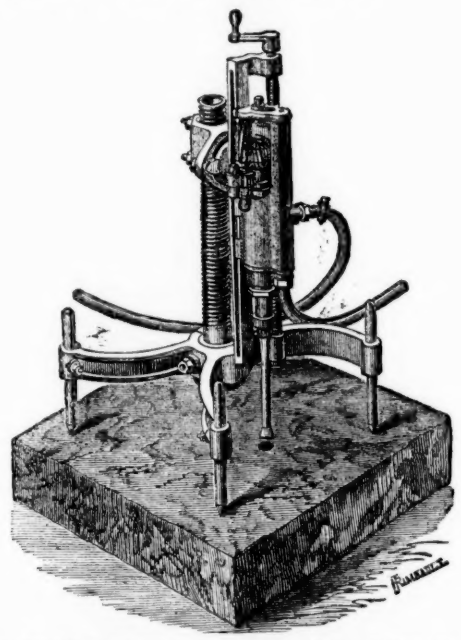

McKEAN'S ROCK DRILL has the following ADVANTAGES over ALL other MACHINES, viz.:—

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This PATENT APPARATUS is EXCEEDINGLY SIMPLE and INEXPENSIVE IN CONSTRUCTION, and is so arranged as may seem best for assisting the substances to be operated upon.
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Large chimneys can be done away with. Succeeds thoroughly in condensing ammonia.
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OF GREAT VALUE IN SMELTING WORKS.

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HYDRAULIC & SANITARY ENGINEERS,
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Crescent Foundry, Cripplegate,
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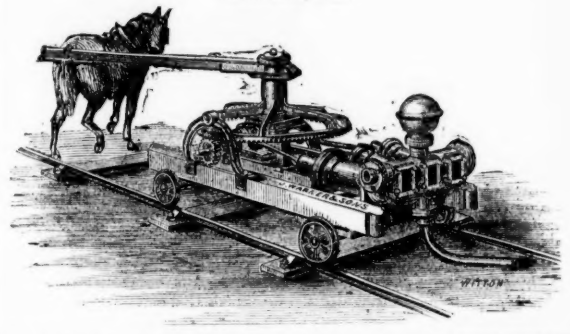

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SPECIALLY ADAPTED FOR UNDERGROUND WORKINGS.
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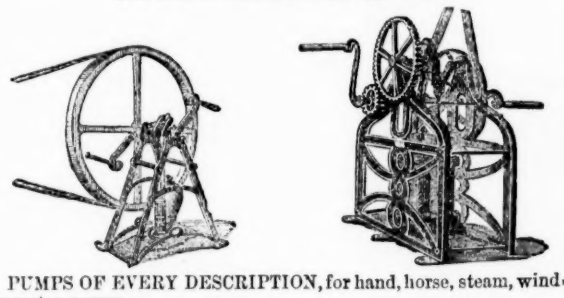

PUMPS OF EVERY DESCRIPTION, for hand, horse, steam, wind, or water-power.
Full HYDRAULIC CATALOGUE upon application.
VIENNA EXHIBITION, 1873. See Award List.—TWO MEDALS and HONORABLE MENTION.

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Warranted free from gumminess. Trials at our expense.
Pale INSTAR SPERM, OLIVE, and LARD, from 2s. 9d. to 3s. 9d. per gallon.
Improved "DON ECONOMIC" OIL, 30 per cent. cheaper than the ordinary kinds.
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Beware of worthless imitations. Agents Wanted. Particulars from
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PUMP LEATHER
WATERPROOF

By a special method of preparation, this leather is made solid, perfectly close in texture, and impermeable to water; it has, therefore, all the qualifications essential for pump buckets, and is the most durable material of which they can be made. It may be had of all dealers in leather, and of—

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Prize Medals, 1851, 1855, 1862, for
MILL BANDS, HOSE, AND LEATHER FOR MACHINERY PURPOSES.

ROYAL CORNWALL POLYTECHNIC SOCIETY INSTITUTED 1833 FIRST CLASS

T. A. WARRINGTON.

CO-PATENTEE OF "THE POWER-JUMPER,"

SOLE AND EXCLUSIVE AGENT FOR

THE "KAINOTOMON" ROCK DRILL,

THE CHEAPEST AND BEST MACHINE FOR SINKING, MINING, AND QUARRYING.

"THE ECONOMIC" COAL CUTTER,

FOR SIMPLICITY, ECONOMY, AND EFFICIENCY UNEQUALLED.

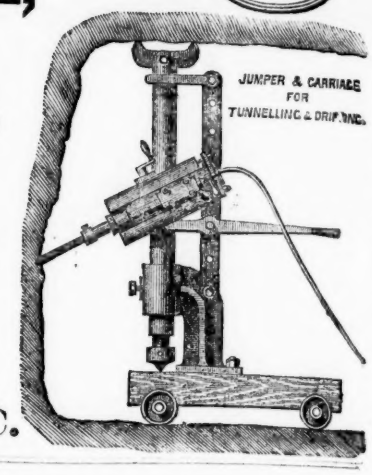
ANDRE'S PATENT HYDRAULIC MINING PUMP,

AND SUPERIOR

AIR COMPRESSORS,

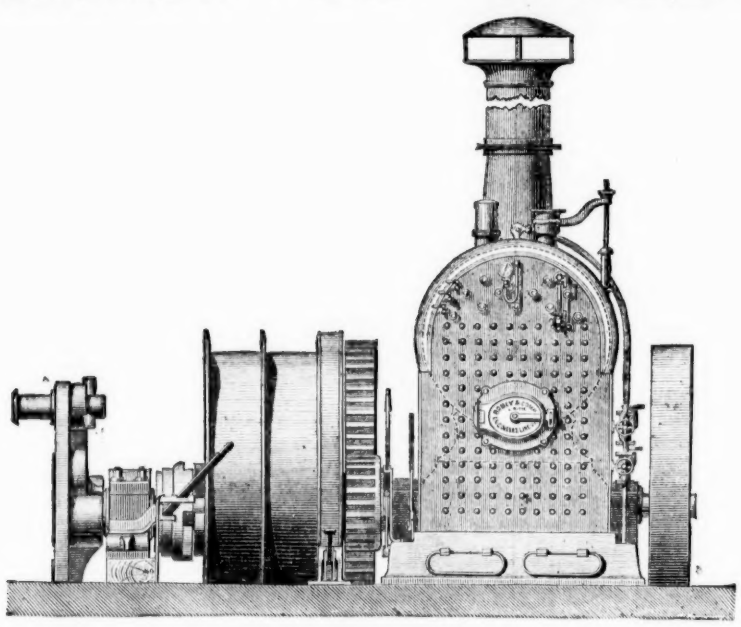
ENGINEER AND CONTRACTOR FOR MINING MACHINERY OF EVERY DESCRIPTION.

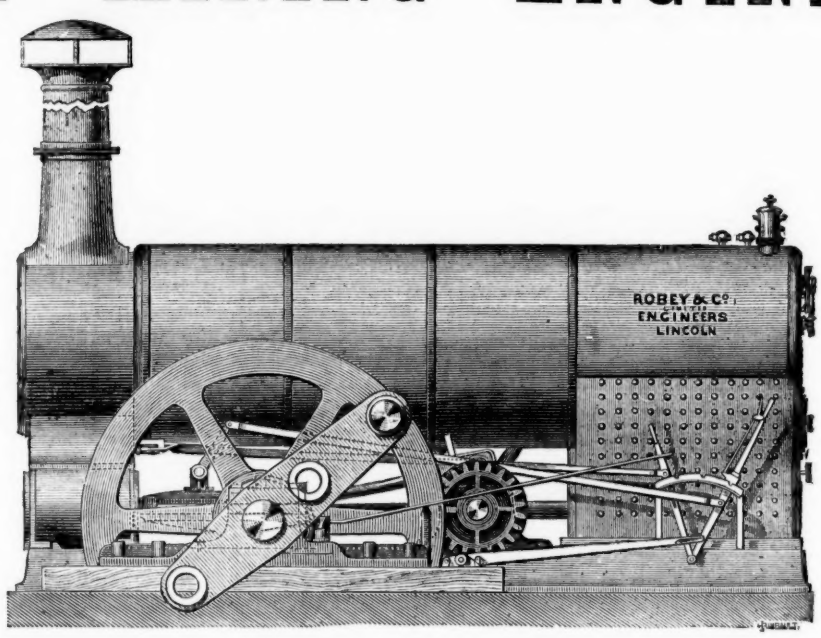
30, KING STREET, CHEAPSIDE, LONDON, E.C.



THE PATENT

IMPROVED ROBEY MINING ENGINE.





Some of the advantages of this New Patent Engine are as follows:—

SMALL FIRST COST.
SAVING OF TIME AND EXPENSE IN ERECTING.
EASE, SAFETY, AND ECONOMY IN WORKING.
GREAT SAVING IN FUEL.

This New Patent Mining Engine is free from all the objections that can be urged against using the Semi-Portable Engine for permanent work, because it possesses the rigidity and durability of the Horizontal Engine, and at the same time retains the advantages of the Semi-Portable, in saving time and expense in fixing.

ENGINES UP TO 200 EFFECTIVE HORSE-POWER ALWAYS IN PROGRESS.

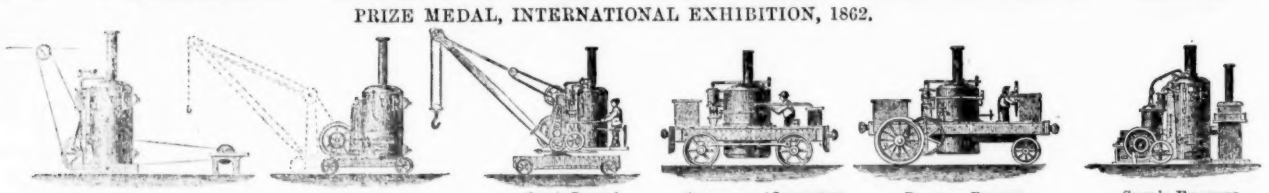
Prices and full particulars on application to the sole manufacturers:—

ROBEY AND COMPANY, LIMITED,

PERSEVERANCE IRONWORKS, LINCOLN, ENGLAND.

CHAPLIN'S PATENT PORTABLE STEAM ENGINES AND BOILERS.

PRIZE MEDAL, INTERNATIONAL EXHIBITION, 1862.



STATIONARY ENGINE, From 1 to 30 horse power. No building required.

PORTABLE HOISY, 1 to 30-horse power. With or without jib.

STEAM CRANE,* 30 cwts. to 20 tons. For wharf or rail.

CONTRACTORS' LOCOMOTIVE, 4 to 27 horse power. For steep inclines and quick curves.

TRACTION ENGINES, 6 to 27-horse power. Light and heavy

SHIP'S ENGINES, Winding, Cooking, and Distilling. Passed by Government for half water.

* These cranes were selected by H.M. Commissioners to receive and send away the heavy machinery in the International Exhibition.

From the STRENGTH, SIMPLICITY, and COMPACTNESS of these ENGINES they are extensively USED for GENERAL PURPOSES, and also in situations where STEAM-ENGINES OF THE ORDINARY CONSTRUCTION CANNOT BE APPLIED.

ALEXANDER CHAPLIN AND CO.,

PATENTEES AND SOLE MANUFACTURERS,

CRANSTON HILL ENGINE WORKS, GLASGOW.

ENGINES OF EACH CLASS KEPT IN STOCK for SALE or HIRE, and ALL OUR MANUFACTURES GUARANTEED as to EFFICIENCY, MATERIAL, and WORKMANSHIP.

Parties are cautioned against using or purchasing imitations or infringements of these patent manufactures.

AGENTS IN LONDON FOR THE SALE OF OUR MANUFACTURES: WIMSHURST AND CO.

MINING PROSPECTUSES AND ANNOUNCEMENTS OF PUBLIC COMPANIES should be inserted in the BARNSTAPLE TIMES, published every Tuesday, and in the DEVON POST, published every Saturday, as these papers circulate largely throughout Devon and Cornwall, where many thousands of investors reside. Legal and Public Companies' advertisements, 6d. a line each insertion; Trade and Auctions, 4d. a line; Wanteds, &c., 20 words, 1s.

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Just published, Free Edition.

GUIDE TO HEALTH; or, ADVICE AND INSTRUCTIONS FOR THE CURE OF NERVOUS DEBILITY.—A New Medical Work on the Treatment of Local Debility, Consumption, Loss of Memory, Physical Depression, Indigestion, and all diseases resulting from loss of nerve power. Illustrated with cases and testimonials. Sent free for two stamps.—Dr. SMITH will, for the benefit of country patients, on receiving a description of their case, send a confidential letter of advice.—Address, Dr. H. SMITH, 8 Burton-crescent, London, W.C.

THE "CRANSTON" ROCK DRILL.

J. G. CRANSTON begs to announce that he is now prepared to supply the above machine.

The "CRANSTON" ROCK DRILL is already in successful operation in several Mines in the North of England.

STEAM BOILERS, AIR COMPRESSORS, and all other MINING MACHINERY supplied.

For prices, estimates, and other particulars, apply to—

J. G. CRANSTON, ENGINEER, 22, GREY STREET,

NEWCASTLE-ON-TYNE.

Original Correspondence.

CAPE COPPER MINING COMPANY.

SIR,—"Another Investor," in the Journal of last Saturday, states the yield of copper ore from the Ookiep Mine was 6000 tons, but for some time it has been 675 tons per month, or at the rate of 8100 tons per annum, and the new pumping machinery having been recently erected it is confidently expected the output will be much increased, so that if the company have not the advantage of a very good price they will have benefit in another way, in the increased production of copper ore; but the present price pays the company very well indeed, owing to the working expenses being low as compared with other companies; and, even if the present low value of copper continues, the company can very well afford the present quarterly dividend of 20s. per share (free of income tax), and even if the yield did not exceed that of 1872.

The reserves above the bottom of the main shaft of Ookiep are now estimated at 50,000 tons and upwards, so that if the company were to stop at the 68 fm. level, and not go down to the intended 80 fm. level, for which they are now pushing, they would not in six years' work cut the copper ore they have in reserve, exclusive of the fact that in the splendid mine referred to the more ore is extracted the more is discovered.

I do not want to puff up the Cape Copper Mining Company, but if the investing public would take the trouble of making themselves up in the affairs of the company, and which they can readily do by studying the plans and sections of the mine, which have been lately received from the colony, and the monthly and annual reports issued by the directors from time to time, all of which can be seen at the offices of the company, Queen-street-place, and where every reliable information can be obtained, they would not put their money into discreditable adventures in foreign countries, but invest their money in mining companies such as the Cape Copper Mining Company, which is worked in British territory, under British direction and British workmen, which now gives on the present value of the shares a return of upwards of 15 per cent. per annum.

London, April 29. ANOTHER INVESTOR.

MINING ON THE PACIFIC COAST—No. II.

SIR,—The gravel deposits spoken of in my letter of March 23 must be of great age, for the running streams of this period have everywhere cut their way through them hundreds and thousands of feet below their beds, thus freeing the gold dust therein contained, and forcing it along down their course, have deposited it in the bars, low lying hills, and flats below, and forming the rich placers that have rendered California so famous. Some years since when these shallow washings began to show signs of failing, it was the general impression that a short time would witness the total exhaustion of our placer mines, for then it was not known that these were only the "outputs" of the original source. But a new era has dawned upon gold washing in California. Instead of seeking in the gulches, flats, and river bars for the shallow or secondary deposits, the miner now prospects for the precious metal on the hill tops and elevated ridges for the deep or original deposit, and when found is comparatively inexhaustible.

There are now adopted two methods of mining our placers—the first and most important is the hydraulic principle. This is practised when the gravel is so situated that large quantities of water can be brought to bear on the gravel bank in a confined condition, as through a nozzle, with great pressure. This powerful stream operating against the face of the bank disintegrates and forces the whole mass into an incline flume made of wooden boxes, which conducts it out of the way, and deposits the gold dust along its course in the riffles, bars, undercurrents, &c., constructed in the bottom of the flume. Gravel thus treated pays very largely, even though it may contain not more than a few cents per cubic yard. You can imagine the quantity of matter that could be removed in 24 hours with (say) 300 cubic inches of water forced through a nozzel of 4 in. or 6 in. in diameter, under a pressure of 200 or 300 ft. playing on a bank of gravel either naturally loose, or made so by the explosion of powder, thus making water the moving and separating agency, and the great quantity treated, dispensing almost wholly with manual labour (one man to direct the nozzle, and a few others to perform the other duties about the mine), renders the whole process so simple and inexpensive that a mine is rendered remunerative when there is only a few particles of gold in a ton of matter removed. I refer now to those cases where the mine carries its own free water, when it has to be purchased at from $10 to $15 per inch, it requires that the gravel contain a greater quantity of gold. With the mines of this class it ranges from a few cents to many dollars per cubic yard; the value of the mine depends upon the facilities for working, the richness of the gravel bed, and the extent of the deposit.

The other method is the "drifting" process; this is resorted to when the surface gravel is too poor to pay for hydraulic mining, and when the rich strata are confined to the bed-rock. When this occurs it is found cheaper to drift, or tunnel, the gravel out, and wash it on the dump, thereby saving the time and expense of "piping" off the worthless mass to reach the rich streak which lies on or near the bottom. Very little water is required, which is also an inducement sometimes, when that article is scarce, or very expensive; and sometimes the gravel bed is capped with lava too hard to be moved by water. Then the only way to reach the gold is to drift it out, when it can be treated at leisure. Some of our most valuable mines are worked in this way, but the gravel must be very rich, for it is much more expensive than the hydraulic method.

Wonderful improvements have been made within a few years, both in the appliances and the method of saving the gold-dust in our hydraulic mines. The "Little Giant" is a simple machine attached to the ene of the pipe supplying the water to the works. It is made of cast-iron, and works on a knuckle-joint; to this the nozzle is attached (any size, from 2 in. to 7 in., may be used on the same machine), and is easily directed to any portion of the bank, depressed so as to sweep the bed-rock, elevated to the summit of the bank, or to either hand, without being moved from its position, all of which is done by one man, who stands by the side of the nozzle to direct the course of the stream flowing through it. The number of these machines used in a mine depends upon the quantity of water obtainable, and the extent of the bank to be operated upon. I have seen as many as five in operation at one mine, using in the aggregate 3000 cubic inches of water, under a pressure of 300 ft. This is the latest improvement, and has taken the place of all other machines for hydraulic purposes in our mines.

The improvements in the saving of fine gold has not kept pace with the washing facilities, although it is far in advance of even two years ago, and something new is constantly being introduced, and we hope soon to be able to say that a larger portion of the 10, 15, and sometimes 25 per cent. now lost by the present mode of collecting the finer particles can be saved.

I hope to be able in my next to give to your readers the history, past and present mode of working, and the results of a representative mine of this class, as I am called to make a thorough examination of an hydraulic property of good repute, now owned by an English company. The manner of opening a deep gravel mine, whether hydraulic or drift, is by driving a tunnel or opencut below the surface of the bed-rock, from some point where sufficient fall can be had to dispose of the debris up under the gravel bed, keeping sufficient grade to give the water sufficient flow to carry away all surplus matter.

It is desirable to enter the mine, if possible, at its lowest depth, so as to drain the whole deposit, otherwise another outlet would have to be constructed before the work could be completed. This is an important matter, both in the purchase of a developed mine and in beginning work on a new one. In this tunnel or cut is laid the "tail flume," consisting of wooden boxes from 2 to 4 ft. wide, and about 3 ft. in depth, paved the whole length with wood blocks, iron bars, or cobble stones; these form innumerable riffles and crevices in which the gold dust settles, as it is separated from the debris by the flowing water. It is usual to "clean up" a few of the upper boxes at convenient intervals during the season, which is done either by turning the water into a parallel flume or into a reservoir above the mine, then taking up the blocks or stones in the bottom, and collecting the gold dust or amalgam with scrapers, brushes, &c., replacing the paving, and proceed with washing as before.

The rest of the boxes are generally left for the final clean-up at the end of the season, when the water begins to fail. A very great improvement introduced within a few years is the "undercurrent." This is a side box of the desired dimensions, usually square, in which are placed horizontal slabs of wood, faced with iron; these are placed longitudinally, and within an inch or so of each other. In the bottom is placed the quicksilver, the upper portion of the stream flowing in the flume, in which the flour gold is contained, is directed over these bars, thereby diverting the current and giving it a more gentle flow; the fine gold it contains is here precipitated through the openings between the bars, and is taken up by the quicksilver at the bottom. By placing a series of these undercurrents along the tail flume a large percentage of the fine gold is saved that would otherwise be lost. Notwithstanding all these improvements in Californian mining much more has yet to be done before a system of perfection is reached. When this is done, and a tithe of our available gravel mines are opened and at work, the gold product of this coast will be very greatly increased.

Foreign capital and enterprise are invited to join us in the development of our deep placers, for although a great deal of home capital is being invested in this direction our cash is limited and dear. It is a conceded fact that there is less risk, and far more probability of success in this class of mining than in any other on the Pacific slope.—*San Francisco, April* 7. JAMES P. CLOUGH.

THE GOLD INDUSTRY OF NOVA SCOTIA.

SIR,—Of the traceable gold yield of Nova Scotia for the past 13 years, perfect returns only exist of the quantities produced from the commencement of 1863 to the end of 1873. These amount in value to 886,893*l.* 7*s.*, derived and averaging as under:—

District.	Value at £4 sterling per oz.	Quartz crushed. Ton of 2000 lbs.	No. of miners as for 1 day.	Aver. per ton of 2240 lbs. Oz. dwt. gr.	Aver. per man per annum.
Sherbrooke.....	£252,041 11 0	70,853¾	438,698	0 17 21	£179 5 0
Waverley	182,128 2 8	78,966	537,004	0 12 22	105 16 2
Renfrew	107,236 18 8	36,197½	262,418	0 16 14	127 9 10
Wine Harbour ...	89,965 5 10	31,571	197,678	0 15 23	141 19 10
Montagu.....	59,455 13 0	5,977	148,590	2 15 17	124 13 2
Oldham	56,419 2 2	15,641	188,162	1 0 5	93 11 0
Tangier	44,703 14 10	14,621¾	225,524	0 16 19	61 16 10
Isaac's Harbour..	41,042 15 6	10,834½	141,189	1 1 4	99 14 0
Uniacke	32,433 10 0	12,299¼	79,248	0 14 18	127 13 8
Unclassified	12,078 15 4	5,825	79,482	0 6 12	47 8 4
Caribou	9,387 18 0	3,206½	23,036	0 16 9	127 2 10
	£886,893 7 0	293,992½	2,321,020	Mean 16 8	£119 4 4

The cost of labour, at 5*s.* per day for the first million and a-half, and 6*s.* for the remaining number of days, may be set down at 622,000*l.*, and the current expenses at 8*s.* per ton (both liberal estimates), or 118,000*l.*, making a total of 740,000*l.*

The total amount of capital subscribed in England—even including the disgracefully mismanaged Land, Gold, and Quartz Crushing Company—does not exceed 60,000*l.*, and hardly one-half of that found its way to the colony. If exploitations should be continued on present discoveries only, the yield to a mean depth of 200 fms. would be over 10,000,000*l.* A sum of 100,000*l.*, judiciously expended in opening up the principal districts in a miner-like way, would soon increase the annual yield to 100,000 ozs., and give large profits for years to come.—*London, April* 29. ACADIENSIS.

NE SUTOR ULTRA CREPIDAM.

SIR,—Bearing in mind the trite old German proverb, "Wer Pech angreift, beschmiert sich," "Acadiensis" refrains from controversy with the "Three Tailors of Tooley-street," or inmates of Earlswood, or whatever the impertinent self-styled "Readers of the *Mining Journal*" may be, whose *cacoethes scribendi* you weakly indulge, or, rather, hold up to ridicule in print; but for the information of intelligent subscribers to the Journal (the "Readers" only get it second-hand perhaps, which would account for their imperfect understanding of its contents, as they have to glance over it furtively), and supporters of legitimate mining, further facts concerning the gold industry of Nova Scotia are herewith submitted.

London, April 29. ACADIENSIS.

GOLD FIELDS OF NOVA SCOTIA—OPINIONS OF ADMITTED AUTHORITIES.

Professor O. C. MARSH: "The great extent of metamorphic strata in Nova Scotia, so similar to the gold-bearing rocks in other countries, and the fact that gold has been found at many widely separate points, would seem to indicate that a new and important source of mineral wealth will soon be added to this already favoured province."

Professor B. SILLIMAN: "There is no reason to fear that there will be any failure in depth in gold product or strength. The formation of the country is on too grand a scale geologically to admit of a doubt on this point, so vital to mining success."

Dr. T. STERRY HUNT—(*Official Report to Dominion Government*): "It may well excite surprise that so little mining has yet been done in Nova Scotia, where gold is known to be spread over an area of not less than 6000 square miles, and where, notwithstanding the want of skill of the early adventurers, and the lack of capital, such remarkable results have been obtained. The lodes of this region, which are very regular in structure, have been shown to preserve their richness to depths of 200 and 300 ft., and from their geological relations there is every reason to believe they will continue unchanged to the greatest attainable depths. To this it may be added that the price of labour is moderate; fuel, both wood and coal, cheap and abundant; the region healthful and easily accessible from abroad. When all these things are taken into consideration, it would appear that no other gold mining region offers such inducements to the introduction of capital and skilled labour, and that these alone are required to make Nova Scotia one of the great gold-producing regions of the world."

Mr. AUGUSTE MICHEL—(*Official Report*): "I am of the opinion that an unnecessary discouragement has had as much to do with the failure of certain gold mining enterprises in Nova Scotia as the want of scientific knowledge and the neglect of proper preparations, and that many of the mines now abandoned as unprofitable will be again taken up with advantage.

Dr. J. W. DAWSON, F.R.S.: "All that I have seen tends to confirm the high opinion which I have elsewhere expressed of the extent and value of the auriferous veins of Nova Scotia, and my belief that a much larger amount of capital than at present might be profitably expended in their exploration, both in the larger extension of the workings in many of the areas now known to be productive, and in the opening up of new districts."

Mr. J. ARTHUR PHILLIPS, M.E.: "There appears to be no reason for believing that gold mining will not become one of the most profitable and lasting industries of Nova Scotia."

Mr. A. R. C. SELWYN, Director of the Geological Survey of Canada: "The reason why two-thirds of the crushing power in Nova Scotia is standing idle seems at first sight somewhat inexplicable. It is evidently not the poverty of the quartz: neither is it, as I can vouch from personal observation, owing to any deficiency in the quantity which the veins, if properly worked, are calculated to produce, and we are, therefore, forced to conclude that it arises from the unskilful, wasteful, and improvident manner in which the business has ordinarily been conducted, creating general apathy, and utterly destroying the confidence of investors. Many instances could be given of yields far less per ton than the quantity now lost at every mill in Nova Scotia having sufficed, under careful management, to give a fair profit to the adventurers. These results are due to the practical and intelligent application of the lessons taught by experience, and if this experience is utilised, and as intelligently applied in Nova Scotia as it has been in Australia, there is no reason why equally satisfactorily results should not be achieved."

Mr. ROBINSON, M.E. (firm of Shelford and Robinson): "He held a decided opinion, which he had often expressed, both in public and private, that Nova Scotia would be found to be one of the most important gold fields in the world when its resources were properly developed; so far there had only been tinkering, or surface work."

Mr. ARTHUR SOPWITH, M.E.: Not a single mine in Nova Scotia had been started with anything like what would be considered in England sufficient capital."

Mr. WARINGTON W. SMYTH, F.R.S.: "As an old dabbler in gold mines in various parts of the world, he could not help feeling much interested with regard to a colony so near the seaboard, and which appeared to offer so many inducements to capitalists who embark in mining enterprise. It appeared quite clear that there was throughout a great part of this region a sufficiently large portion of gold extending throughout these quartzose deposits, whether beds or veins, to pay well for mining enterprise. Was it not possible, then, instead of 600 or 800 men to employ 6000 or 8000, or even more, in raising gold, to the advantage of all concerned? Undoubtedly it ought to be so, for there was no doubt here there was a gold field such as was seldom to be met with. There ought to be machinery and appliances brought to bear upon these mines such as would ensure a very handsome return to capital invested in undertakings intended to last over a long series of years. This was a point of almost imperial importance, for it appeared that up to the present time the resources of the country had been developed to a pitifully small extent; and, no doubt, this was because the undertaking had been conducted by persons unprovided with money, or with that intelligent guidance which it might be presumed they would have had if the matter had been taken in hand by persons better provided with money, without a good supply of which nothing could be successfully carried on. In spite of previous causes of failure it was evident that many of them would disappear the moment that large capitalists were prepared to go into the matter, because if large companies were formed in England they would of course employ agents familiar with the machinery and appliances requisite for successful mining, who would open workings upon a very different scale from anything that had yet been attempted.

London, April 29. ACADIENSIS.

KALOSIC GAS.

SIR,—The commencement of Mr. Isham Baggs' letter is not only complimentary, but it appears to recognise with perfect accuracy the motives which prompted my comments upon the report on the kalosic gas. Mr. Baggs, at first, also does me full justice in acquitting me of any intention of misstating the case, and admits the possibility of having himself inadvertently somewhat fogged the question. This fair and candid tone, however, is not successfully carried to the end, where my arguments are termed "specious and empty," and the groundless imputation is made that I write in the interest of some frightened gas company.

My calculations were founded upon certain statements, and it is possible that I may have erred somewhat in endeavouring to reconcile, in my own mind, some of these statements with others in the same report. Mr. Baggs spoke of a grand total of 60,186 lbs. of mixed gases, at 2000° Fahr., being the result of the combustion of a single ton of coke under the patent. This would require fully the 300 ft. of air per pound of carbon spoken of by him. It is also well known that the heat given off by the ignition of carbon with a full complement of oxygen is as 76 to 62, when it is first turned into carbonic oxide, and then burnt. I had, therefore, not unnaturally, a hazy notion that Mr. Baggs in some way combined the two operations so as to obviate the loss.

I now gather that the "grand total" includes all the products of combustion from first to last, and may, perhaps, exceed half-a-million cubic feet in volume. But what of it, to what purpose does this calculation of the "grand total" of the products of combustion tend? The real estimate of calorific value must be wholly contained in the gas made in the "first operation," which is, I suppose, the kalosic gas. We are told that experiments on the largest scale have produced *upwards* of 220,000 feet of heating gas from a ton of coke, at 2d. per 1000 feet. If this be correct, there must be several ropes in Mr. Baggs' ship of which he appears completely unaware. As I previously explained, a ton of coke gives, at most, 4666 lbs. of carbonic oxide (Mr. Baggs does not question this); but, as the smallest theoretical quantity of air capable of oxidising that amount is 11,591 lbs., the weight of nitrogen mixed with the carbonic oxide is 8925 lbs., or, reduced to volume in round numbers, there are 62,000 feet of carbonic oxide to 116,000 ft. of nitrogen. But this pre-supposes absolutely perfect combustion, without the least excess of air. To make up what is said to have been produced—220,000 ft.—42,000 ft. of air must positively be mixed with these gases, and, as this contains nearly 34,000 ft. of nitrogen, the proportion of carbonic oxide to nitrogen must, according to Mr. Baggs' own statement of results, be 62,000 ft. to 150,000 ft., or 1 to 2·4. My own experience leads me to believe it will seldom be produced with so small an excess of air, and 1 to 2·8 will be found a highly favourable result.

Here let me point out that neither common air nor kalosic gas can be termed definite chemical compounds. Nitrogen does not necessarily combine, in the proportion of its combining equivalent, with oxygen to form air, nor will it enter into definite chemical combination with carbonic oxide to form heating gas. This is Mr. Baggs' first great mistake, he appears to have thought that mixtures of such gases would chemically combine, and in their proportional equivalents only; whereas they mix in any proportions, and do not, chemically speaking, combine at all. So much for Mr. Baggs' misapplication of the principles of the atomic theory and volumetric chemistry (?) Now, to enter my protest against the assumption that intensity of heating power is any guide to the quantitative heating capacity of a fuel. Intensity of heat depends so largely upon the nature of the furnace or burner that deductions drawn from the melting even of a wrought-iron pipe may prove utterly fallacious when applied to general heating purposes. In the same manner I would earnestly deprecate any dependence being placed upon the relation of the actual power of evaporating water as compared with the theoretical units of heat. It is a fair comparison to estimate the units of heat shown by the composition of one heating gas against the known co-efficients of another, but I cannot accept the responsibility of calculating the practical boiler power of so many thousand feet of gas. This is what will have to be solved, but I should not expect to obtain so good a modulus from a gas largely diluted with nitrogen and common air, as from others containing no inert constituents. In the meantime, permit me to correct my former result by leaving out of the calculation the amount of excess air from disturbing causes, although I am fully persuaded that a considerable quantity of such excess will always be present. The best theoretical estimate I can arrive at, after Mr. Baggs' further explanation, is that kalosic gas may show 13·1 units of heat against 100 units of common 13-candle gas. H. C. BARTLETT, F.C.S.

Laboratory, 7, South-square, Gray's Inn, April 27.

KALOSIC GAS.

SIR,—Our attention has just been called to an article which has appeared in a recent number of the Journal, describing a "New discovery" called "Kalosic Gas," and stating that we are about to report professionally upon the process. As this is not the case we shall be obliged by your inserting in your next issue an announcement to that effect. JOSEPH QUICK AND SON.

Great George-street, Westminster, April 29.

KALOSIC GAS.

SIR,—I called this morning upon Mr. Joseph Quick, jun., and found him greatly annoyed at the mention of his name in connection with an article on the above subject, published in the *Mining Journal* of April 4. He read me, moreover, the proof copy of a letter just written by him, and forwarded to you for publication next Saturday, containing an indignant repudiation of the whole affair. This affords me an opportunity of replying, and of at once stating the true facts of the case. In August last, having successfully completed my experiments at Aldershot, I asked Mr. Quick if he would like to see them repeated. They referred entirely to the evolution of heating (now called kalosic) gas. He accepted the invitation, and we went there, accompanied also by a friend of his, an eminent gas engineer. For certain reasons, best known to the gas contractor at Aldershot, he refused to allow his man to light my furnace fire on that occasion, of which fact I apprised both Mr. Quick and the gentleman in question before we started. Consequently, when we arrived there was nothing to be seen at work, and the matter resolved itself into a mere explanation on my part, and a reference to the apparatus as it then and there stood. There was no report given, and none asked for. Moreover, there was no proposal on the board, and no negociation whatever upon the subject then or since. The visit, as I understood it, was one entirely of scientific enquiry. I may add that though I have called at the offices in George-street on two or three subsequent occasions, yet I have never seen Mr. Quick himself since, from that day in August, 1873, till this very morning in April, 1874. Towards the end of last January, however, two gentlemen with whom I was in negociation called upon me and said "it was very desirable that a report should be obtained from some competent engineer, had I any objection to such being done?" "None, whatever," I said; "I court investigation." "Did I mind who it was?" "Not the slightest. Bring anyone you please." "Should I object to Mr. Quick?" "Certainly not. I should be very happy to see him." In a few days after I was informed, through the same channel, that Mr. Quick had been applied to, but was too busy to come. He would, however, send one of his engineers; and on Saturday, January 31, a gentleman who was well known to me came from his offices, my two negociators being with him. When I first stated the facts of the case to him he was most incredulous as to their possible reality. They were far too good to be true; I must be dreaming, surely, and he laughed very heartily at my, evidently to him, exaggerated figures and results; but when he submitted those facts and figures to a closer examination and calculation over a period of three or four hours, interrogating me closely, and asking many questions again and again, his doubts began to give

way; and, as the investigation proceeded, his disbelief was ultimately and completely changed into openly expressed conviction and astonishment. The generation of the gas, and its applications to heating and lighting were all passed under review; and when he left he said "I am greatly pleased with what I have seen to-night. I am satisfied you can make the gas at the price you state, and that you can produce a very beautiful light. The only thing I am not satisfied of is the exact quantity of the heavy petroleum oil you require per thousand cubic feet of gas to produce this light, but I can see quite enough to convince me that it is very small."

I enclose you three letters for perusal, two are from one of my negociators, the third is from the engineer himself, and is dated Feb. 5. You will see that they fully and completely authenticate in all important points the above statement, and contain numerous references to the report made by the latter, and communicated to his principal, and which is therein clearly proved to be favourable. I was refused a copy of this report by the engineer, and have not, therefore, even seen it. It will be observed from these facts that I did not solicit the report myself, it was thrust upon me, but certainly not for my benefit, as it appears. I am the last man in the world to use another man's name or reputation surreptitiously, or for purposes of my own. I furnished the matter, as you know, but did not write the article in question, which I am sure, however, was written in all good faith, and without any intention to give offence. That such a result should have followed has caused me extreme annoyance. ISHAM BAGGS.

[We have seen the letters referred to, and they quite corroborate the statements of Mr. Baggs.]

COMMITTEE ON EXPLOSIVES.

SIR,—I hope that some one of your readers who is interested in the subject, and who has sufficient leisure, will call attention to the Select Committee on Explosives. The action of this Committee will probably regulate the conditions under which explosives are stored, transported, and sold for some years to come. It appears to me that the acknowledged safe explosives—gunpowder, dynamite, guncotton, and lithofracteure—should all be put under the same rule, so that no vexatious restrictions hamper one which do not apply to another. Why should not any authorised person, such as an ironmonger or vendor of gunpowder, be allowed to keep (say) 10 lbs. of either of these materials to sell in smaller quantities to miners? Why should there be transport licenses? The railway and canal companies might convey under their by-laws, and, indeed, should be required to convey; and it is an admitted fact that no accident has ever taken place with dynamite, either in transport or storage. The importance of the question is, I hope, a sufficient reason for my bringing it under the notice of your readers. MINER.

London, April 30.

GREAT LAXEY MINING COMPANY.

SIR,—I perceive a letter in the Journal of April 18, signed by Jonathan Dearden, H. B. Noble, F. Kinderdine, and Robert Lomax, stating that in consequence of what I said at the meeting on the 8th inst., "We, the undersigned, went to the office in London, and there saw one of the directors (Mr. Spittall) and Mr. Allen, the secretary, and asked what books were there. We were told only two, the register of shareholders and the transfer book; we desired to see the latter, but were refused by the secretary, who said he had no orders to produce it. Mr. Spittall expressed some astonishment, whereupon we appealed to him to permit us an inspection, but he evidently considered himself powerless, for no inspection did we obtain." These persons cannot be so ignorant as they profess to be; they must know that the "transfer book" of a company is not open to *general inspection*, but a shareholder applying to know that his own shares are entered always obtains satisfaction on that point.

Mr. Allen, the London secretary, knows that the course I name has been pursued ever since his appointment; and during the life of Mr. W. Taxford, the London director, who was almost daily in the Great Laxey office, the same rule always applied. I stated at the London meeting, and I repeat now, that the general accounts of the mine and the company are always open for the inspection of any shareholder, and I named that Mr. Dearden's friend, Mr. Wm. Stevenson, availed himself of the privilege, by taking very copious extracts from the accounts of the company in the Douglas office, where they are kept. Three of these parties have at various times been in the Douglas office, and received all the information they required. You must, therefore, see that the object of these parties in publishing their letter in the Journal was not to convey truth to the shareholders, but to mislead them. GEO. W. DUMBELL.

Douglas, Isle of Man, April 27.

ON TIN STAMPS, AND THE FUTURE OF CORNISH MINING.

SIR,—Having noticed the depressed state of Cornish mining, and the low price of tin, with the majority of the engines and stamps silent, I have not offered my stamps to the public. I was under an agreement to put it up at St. Blazey Consols in May last. I got it up at Wadebridge foundry, and worked it with a little 8-in. engine. It worked beyond expectation. When about to take it to the mine I found they had little—or I might say no—water to work it. They proposed to work it by steam, but their engine was so fixed that they were six months drawing out 40 fms. of water from the mine: it could not be worked by that steam-engine. Then the company rented a corn mill, in order to obtain water, but before that was ready the mine was in the Stannary Court, and nothing to be done in stamping. This unfortunate affair prevented me erecting the new stamps for which I was awarded a silver medal.

A great many new plans for stamps have been proposed and carried out. I have inspected them all, and I can see nothing in any of them to prevent me bringing out my stamps. I am confident it will answer. Those tried were "got up" by men who never knew what a stamps should do. The only one that I know now at work is Husband's, or rather the American, costly to erect, works too fast, and is a great coal consumer. Those wanted in our Cornish mines should be capable of being quickly and also cheaply erected, to consume far less coal and do a deal more work for the cost, and to be worked by water-wheels, where water is to be had. As we are not likely to have cheap coals again, we want stamps that will work economically, to meet low-price tin imported. I observe that tin is advanced 5*l.* per ton; this shows a turn of times, and induces me to offer to erect my trial stamps on any mine, and to attach it to either water or steam power. I prefer a promising young mine on which to try the result of the stamps, without going into useless cost, and spending some 20,000*l.* or 30,000*l.*, when the company by so doing find themselves suddenly in the Stannary Court. I will erect my stamps on any mine that I approve of, the parties to have the patent right to work it, charging them only the cost of erection, and that is comparatively a trifle. If not approved of I will remove it.

I may here remark that I received a letter a few days since from an old practical, one who has been long in the service of men doing the most extensive mining ever carried out in the two counties. He says that he quite agrees with what I have written, that new and shallow mines must be looked for in these counties, and lodes must be first found by trenching, and their intersections proved. He says he has adopted my plan, and he has discovered a new lode, or even lodes, with fine backs shoal, for over two miles in length, unbroken, in a good district, and he never saw a lode show better indications. I say there are hundreds of such places as yet undiscovered in Cornwall and Devon. Let any sane and watchful man look around and find an old deep mine in the second 100 fms. that has been re-worked after the water was left in that has paid cost in either of these two counties. I say every mine that ever paid in the two counties derived all their extraordinary dividends from shoal working. It is a farce for any miner to tell his shareholders to go deeper to find paying mines. When a mine is sunk 50 fms. below adit has not paid dividends stop it. Had they trenched the ground first they would have known where the side lodes were to be found, and the cross lode, and sunk the engine-shaft in quite a different position to confute me. Surely some of these knowing ones, ever advising to go deeper to find ore, will point out the men who have made colossal fortunes from deep sinking. Look at the extra cost of deep sinking, with the present price of wages, coals, and materials. I say the chances of deep sinkers are 50 to 1 against them. Paying mines are found shoal, just as fruit is found on the upper portions of trees, not in their stocks. N. ENNOR.

St. Teath, Camelford.

THE DEATH OF THE GREAT WHEAL VOR UNITED MINES, IN THE PARISH OF BREAGE—AND HOW TO RESTORE THEM TO LIFE AGAIN.

SIR,—These mines, or a part of them, have been working for more than a half-century, therefore they are well known to the people of England, particularly as they have been so rich for tin. The part of these mines, which have been working under a London management for nearly twenty years, is called or known by the name Pooldown, and although great profits have been given to the adventurers, yet far greater profits might have been given under a different management. Thousands of pounds could have been saved in the erection of the necessary plant. Thousands of pounds have been wasted every year in extra consumption of coal (taking other matters in respect thereto into consideration), in consequence of improper pitwork connected with Ivey's engine, &c.

About 1000*l.* per year profit might have been made in the working of the leavings on the mine. Thousands of pounds worth of tin might have been raised from the rich deposits near the flat rod shaft, during the last few years, without incurring one penny more expense in water charges. This ground was, in a measure, locked up for years, having been condemned in the face of a continuation of a shoot of tin for a great depth. An inhabitant of Breage wrote to the Chairman of the committee of management for these mines about two years ago on the subject, after which, the adventurers began to increase hands, and I am happy to say that the tin raised from these rich deposits, discovered in the ground which had been locked up has been the means of saving the mines for the last year or two. The adventurers are now engaged in drawing the materials in this mine, and the rich bunches of tin now in sight will, in a week or two, be under water, but I hope only for a short time, as within the last two or three weeks a very rich bunch of tin at Edwards's has been discovered, which is about the middle of the sett. I understand that there are now two rich deposits of tin in this condemned part of the mine going into whole ground, worth 100*l.* per fathom each. I do not think that there is a mine now working in this district more promising than Pooldown. You will see the large amount of dues paid to the lord, and the amount of profit given to the adventurers by the working of this part of the mine, by referring to the report of the last general meeting of the adventurers.

The death of the Great Wheal Vor United Mines will cause much distress in this neighbourhood. The re-working of these mines would produce great prosperity in the district, and if managed on economical principles would even now give a profit to the adventurers. If the present company of adventurers would offer these mines and materials for sale as a going concern no doubt they would meet with a purchaser. The people in this neighbourhood are surprised at the death of the Great Wheal Vor United Mines, which is the general subject of conversation. I think the adventurers would also be surprised at their drawing the materials, if they or anyone on their behalf were to inspect the mines before the rich deposits of tin are covered over with water. I ask the adventurers to visit the mines with the Journal containing my letter in their hands, as they will then see if the statements herein contained are correct.

Breage, April 25. A LOVER OF JUSTICE.

P.S.—The lode at Pooldown is subject to small and large cross-courses. The men working on the rich bunch of tin at Edwards's met with a small crossing lately, but after cutting it through found the lode equally as good the other side. They are now come to another crossing, and the men are stopped from working. The large cross-course is from 10 to 20 fms. west of the present workings. It is the general opinion of miners that this tin deposit at Edwards's will prove to be a very large and rich one, as this large cross-course produced a large deposit of tin in the lode at the old Wheal Vor, not far from the Pooldown lode. The workings on the lode in this mine, near the cross-course, were so large that you could easily drive therein a wagon and five horses. A. L. O. J.

NOTES ON LEAD MINING IN CARDIGANSHIRE—No. II.

SIR,—In my last letter, dated the 21st inst., I pointed to the fact that it was a matter of congratulation that, during the various changes and depression in the price of tin and copper, lead had remained so firm as to cause little uneasiness to those parties who are in possession of mining properties of this description. In calling attention to the great facilities for working the mines of this county, by the employing or the use of water machinery for the purposes of draining the mines, the drawing, manipulating, and cleansing the ore, and, in fact, for every requisite purpose, it may not be amiss to state that there is not another county in the kingdom where the underground water is so little to contend with—the majority of the lifts varying from 4 to 9 inches in diameter, and there is scarcely an instance of one being above 10 inches, either as a drawing or plunger lift, thereby rendering a less power in machinery necessary, as well as a great saving in cost, in iron, leather, and other materials used for this purpose; whilst the price of labour has been for 40 years past both cheap and abundant, and I may fearlessly state that in no part of the United Kingdom can better miners be found for all and every purpose than Cardiganshire can produce. With these facts before us I intend giving a few particulars relative to some ground now granted and lying unwrought for the want of capital to work it; and I will, after giving a few remarks more on the Powell Consolidated Mines, on which I touched last week, point out a piece of ground to the west of it, where 3000*l.* as working capital, fairly and judiciously laid out, could not fail in opening out a most valuable and lasting mine.

For many years past the Powell Consolidated had been worked by means of a steam-engine at a very high cost, but this has now been done away with, although the engine has been wisely kept on the mine, and in case of necessity, either in a very severe winter or an unusually dry summer, may be put to work for any purpose required. The richest of the lodes in this grant, of which there are three, is Crosley's vein, running about 30° south of east and 30° north of west, and on this vein about 50 fms. long only has been opened, 30 fms. of which has proved to be ore-producing, and for that distance has yielded from 2 to 3 tons of lead ore per fathom, or worth on an average 30*l.* per fathom. Price for driving about 8*l.*, and for stoping about 3*l.* 10*s.* per fathom. It has been generally supposed that Crosley's lode averages in width about 5 ft., but in reality there is no doubt that the square of that figure, or 25 ft., is a great deal nearer to the mark, for in the bottom end west, which is the 72 fm. level under adit, the lode has been stripped down to upwards of 20 ft. wide in a course of lead ore that will produce from 80*l.* to 90*l.* worth per fathom, and this, be it remembered, is being opened all in whole ground, and is the farthest level west, and is within a very few fathoms of West Powell grant, where the vein has been seen of a precisely similar character at surface as at the Powell Consolidated, and producing excellent stones of lead ore and gossan.

The West Powell extends from the Powell Consolidated boundary to the Cefn Brwyno boundary, a distance of nearly ¾ mile, having the Crosby lode passing in the centre of it for the entire distance, and a parallel vein to within 40 fms. of Crosby's, of a very fine description, has also been found at surface, and can be proved by cross-cutting, wherever thought proper to do so, and which will, undoubtedly, be found very productive in depth. Some few months since this property would require to be worked by means of a steam-engine, but arrangements can be made with the parties who brought in the water for working the Powell Consolidated and other mines for using the water flowing to their mines, and should a greater quantity of water be requisite for these properties, the present water-courses could be extended back to the River Rheidol, and an abundant supply obtained for the working of every one of them. With these advantages possessed, and a growing tendency on the part of the landed proprietors to offer facilities for the proper development of their ground, as well as a lowered or reduced royalty, it can only be wondered at that such properties as I am here describing should not be taken up and worked with avidity; but the truth is, there are few who interest themselves in the welfare of the county, and this applies more particularly to its mining interest, for those who have enjoyed a long and lasting prosperity from its mineral resources seem to think and act by the old plan, that to leave well alone is a judicious one, whilst the other portion adopt the principle of saying little and doing less to further its prosperity.

It may be thought that there are not many grants to be had so favourably situated in all respects as the West Powell Mine, and that I have selected this for a particular purpose. To those who may be of that way of thinking I shall endeavour to show in future letters that this is by no means an exception, but that there are many such to be obtained, on the most fair and liberal terms, which could not fail in enriching the capitalist, paying the landed proprietors a large amount of royalty, and affording the community the employment they require. ABSALOM FRANCIS.

Goginan, Aberystwith, April 28.

METALLIFEROUS MINING IN THE HIGHLANDS.

SIR,—It was a source of gratification to observe under this heading in last week's Journal that endeavours were being made by the Marquis of Huntly to prove the mineral wealth supposed to exist on his estate of Ballater, and it is to be hoped that his worthy efforts may be crowned with success. The prevailing rock formation of the district is gneiss, trap, and primitive limestone—a formation very favourable to the existence of metallic ores. The two former, particularly the gneiss, are said to be cut across in many parts by veins of quartz, &c., containing fluor-spar and galena. Considering that the operations as yet have been of a very limited extent, the success met with is very encouraging, and such as we hope will induce his lordship to continue the work of exploring.

It is surprising that so little attention has hitherto been given to the developing of the mineral wealth which, no doubt, exists in many parts of the North of Scotland; and it is to be hoped that many other landowners will be induced to follow the example already set by the Duke of Sutherland and the Marquis of Huntly, in proving the existence of minerals on their properties, and the day may yet come which will see a thriving mining industry in the North.

In a parish of Banffshire iron ore exists in great abundance, the quality of which is said to be very high, specimens of it having been analysed, and found to contain 85 per cent. of iron. This ore was worked about the middle of the last century, and was transported some 16 miles over the hills on horseback to a wood, where it was manufactured with charcoal by an iron company then established there. Since that time we understand that the late Duke of Richmond, about the years 1840-45, again made some attempts to work the ore; but, doubtless, the want of railway communication then proved an insurmountable barrier to the profitable working of the mines; but now that the Great North of Scotland Railway has penetrated the country I believe that the ores could be conveyed, either on land or by sea, into the manufacturing districts at a price that would allow them to compete favourably with ores from other districts. Very rich veins of manganese are also known to exist in this district. Plumbago is found in considerable quantities and of good quality in the intermediate neighbourhood. Red oxide of iron, or ochre, locally called "keel," I am informed exists in several places in the North, but the only use hitherto made of it has been by the farmers, who use it in its natural state for marking sheep.

About nine months ago I had some correspondence with a very intelligent gentleman residing in Inverness, who had opportunities of knowing the localities well, and who informed me of the existence of a coal seam which is seen to crop out by a stream somewhere in Nairnshire, but the exact locality I do not in the meantime remember; he also informed me of indications of a strongly ferruginous nature, to be seen near the famous field of Culloden.

Many other localities could, no doubt, be cited, showing strong indications of a metallic nature, which in other and more favoured parts of the kingdom would be sure to draw the attention of capitalists, but, somehow or other, people who invest their spare cash in mines appear to have more favour for investing in properties at a distance from England, and out of their immediate control, than they have for anything nearer home, and thus a great amount of English capital finds an outlet in worthless American and other foreign speculations, a part of which might be profitably employed in exploring and developing the mineral resources of untried parts of our own country. JAMES CAMPBELL.

Cambridge-road, Turnham Green, April 30.

MINERS' PAY—THE THIRTEEN-MONTHS PAY SYSTEM.

SIR,—Your Camborne correspondent has written a most ingenious letter, and wishes for an answer to supply the "irrefutable" arguments against the 13-months pay system. He does not appear to have read the Journal regularly, which has supplied the arguments he asks for, both by letters and comments which have been written upon this subject, since, I think, the latter end of January last. I can conscientiously state that I have not seen or read anything yet to justify a refutation of the arguments against this system, and certainly your correspondent's last letter does not touch the vital—in truth, the vicious—principle of rendering accounts at irregular dates in the year.

It is easy to contest the truth, and to try and ignore the facts with epigrams, &c., but still truth remains.

There is a specious point asked by your correspondent—"Does not 'Unity' know that if there is a debit side 13 times a-year there is also a credit side?" It is needless to remind anyone understanding accounts there is a credit as well as a debit side; but, in answer to this, is there 1-13th more production in the year in consequence than there was; but he conceals the fact that the expenditure is increased by the 1-13th pay in the year. This is, however, beside the main question—the irregular dates at which mining accounts are brought up by the four-weeks pay system, the principle is bad, and, notwithstanding your correspondent's advocacy of it, there is nothing he can consistently adduce to justify it. Therefore, "a man convinced against his will, is of the same opinion still."

There is a kind of sub-letter or addendum to his letter. Whether he is the author of it directly or indirectly you may know, but be that as it may, I have only to remark that those who condescend to resort to epithets have a bad cause to defend, and are judging others by themselves. UNITY.

PROCEEDINGS AT WEST SETON MEETING.

SIR,—In last week's Journal you gave a report of the last meeting, in which I read that Mr. Matthews was in the chair, and that the meeting was opened by Mr. Smith, who, in a burst of eloquence, gave the decision of the committee. First, they had gone to the expense of calling in Capts. Josiah Thomas and W. Pascoe to tell them and the adventurers what their own agents should have been fully prepared to tell them at any time. He next told the adventurers "they owed the lords a debt of gratitude" for comfortably and resignedly submitting to receive their dues from time to time: at least, I failed to discover that they had done anything else. He then said "he thought it the duty of all present to give a hearty vote of thanks to the lords' agent for assisting the committee" to render the adventurers such signal service—nothing. Capt. J. Thomas then read the report. The committee would have received the report from their own agents had they the unbounded confidence in them they pretended to have had at a former meeting. After the reading of the report, Mr. Smith said the lords had consented to the stopping of the unproductive parts of the mine—*i.e.*, the parts from which they received no dues. What generosity! The engineer, in moving the adoption of the report, congratulated the adventurers on the improved prospects of mining; taking credit, as it were, for the committee for putting up the price of tin. Mr. Smith formally proposed a vote of thanks to the lords for their conduct towards them. I want to know what the lords did for the adventurers, as from all I see they did—nothing at all. The mine doctor moved a vote of thanks to the committee. "They had assiduously, carefully, and satisfactorily done their work, and accomplished"—nothing. Verily! they had done nothing for the poor adventurers. He said a better committee could not be found. I say they could not have done more for the adventurers if they had all died immediately after being elected, nor could they have done less. Mr. Basset's agent said "he had worked hard and to the best of his ability, and was warmly aided by the committee." I challenge anyone to find another committee who did nothing in a more business-like manner. I, too, believe for doing nothing that committee could not be surpassed.

Let us summarise the whole of the proceedings. A meeting was called to decide on what steps should be taken to deal with the additional water which would flow into West Seton from the stopping of neighbouring mines. At the first meeting a committee was formed, and after they all dined together. The second meeting was called to hear the report of the committee. The committee there stated "they had not yet been able to bring anything before the adventurers." They then all dined together. On the 23rd instant the third meeting was held, but in the interim tin had advanced. Wheal Seton and North Crofty had not ceased working, so the committee escaped censure for doing nothing. Here we have as the result of all these meetings and arduous labours of the committee. All the expenses of these dinners with drink, cost of Capt. J. Thomas and Capt. Pascoe's reports, inconvenience and loss of time of the adventurers in attending the meetings, printing, stationery, &c., for all these things combined failed to do more than pass a resolution "That no steps in the matter be taken at present." For doing all this the

lords were thanked and the committee landed to the skies. What a happy state of things have we here! After all these things let no one offer up one complaint against London committees of management, against London offices, or any other single thing that comes out of London. ADVENTURER.

REMARKS ON THE "ORIGINAL CORRESPONDENCE" IN THE SUPPLEMENT TO LAST WEEK'S "MINING JOURNAL."

SIR,—Mr. Richardson has given us some very cleverly executed and instructive sections of "the Great Caribou Mine;" and if he had confined himself to sections of ground actually examined would have rendered them of much greater value than they can possibly now obtain. On examining section Fig. 1, in connection with his letter, we find that in estimating the value of the mine he has assumed the worth of the lode 60 ft. below the present bottom level. Now, Mr. Richardson must, as a mining engineer, know that such a valuation cannot be anything but utterly unreliable. But this is not all, as only about 120 ft. in length of this lower level can have been seen, whilst Mr. Richardson assumes as proved, and fixes a value on, about ten times that length, along a line altogether 60 ft. below any working or part proved, half of said line being 240 to 300 ft. below any tested point. As he says several mines are about to undergo a similar ordeal this year under his direction, we have no doubt but that by next year his valuations and sections will be much more valuable and reliable than at present, for he will by that time have learned how little reliance can be placed upon calculations as to the value of metallic mines so far beyond his vision.

There is nothing in your correspondence this week calling for remark from us, except a letter from "Troon Institute," on "Miners' Pay." This letter is so full of bombastical nonsense that we do not wonder at the writer's "confidence." If the "accounts for a mine meeting" he is so "confident" of preparing are brought forward equally clear with the last paragraph in his letter, the shareholders would be, no doubt, very delightfully enlightened. Even Emerson or Carlyle could not give us a more refreshing sentence of delightful obscurity than this talented individual has done in the following:—"I believe—although I trust not—the day is distant as, whilst standing on the mountain of expectation, we see no rays of association from the Oriental sun of mining emporium to dispel the foul and loathsome clouds of unpleasantness and discontent, and to scatter broadcast the ambrosial, refreshing, and cheering beams of sociality and intercourse which would inevitably be conducive to prosperity and success in Cornish mining." After such an ariel flight (we hope we have not missed a word) we look with eagerness for this gentleman's promised "few suggestions concerning mining."

READERS OF THE "MINING JOURNAL."

THE BAMPFYLDE MINE.

SIR,—Having had the above mine strongly recommended for purchase, I wish to know, through the Journal, where all the copper ore goes to which is raised, or said to be raised, in it monthly? From the regular Swansea list I can only make out 100 tons sold during the last six months, for about 650*l*. But what is this compared with the numerous cargoes of ore talked of in the weekly reports of the last six or eight months? Will the agent or purser tell us the exact amount sold at Swansea, and price realised? A mine that certainly does not hide its light under a bushel will not, of course, be afraid of a little criticism. CAUTION.

WEST WHEAL LUCY.

SIR,—What a pity such a promising piece of mining ground as this should be left idle for want of capital to develope it! It is a well-known fact that there is not such a kindly sett in the Lelant district as this. Gentlemen too often make mistakes in investing in deep and expensive mines, and pass by young and inexpensive ones, which are far better to invest in. There are mines in the district that have yielded more than 1,000,000*l*. sterling, and the same lodes, without a doubt, traverse this sett; and not one of the mines could show better prospects at the depth this mine has been wrought. Here is a fine field for capitalists, when a small amount of capital will place this mine amongst the best in this county. H. S.

Lelant, April 30.

LLYNVI VALLEY COLLIERY COMPANY (LIMITED).

SIR,—My attention has been drawn by a shareholder to the quotation in last week's Journal of Llynvi and Ogmore Company's shares at 5 discount on the supposition that such are the same as the 10*l*. preference 15 per cent. shares of the Llynvi Valley Colliery Company (Limited), of which I am the secretary.

Will you kindly insert this letter in your next issue, as I wish to remove the above erroneous impression?

The preference shares of the Llynvi Valley Company (Limited) have never been negociated, as far as I know, under par to ½ premium. W. H. FORBES,

Finsbury Circus, April 30. Secretary.

AUSTRALIAN MINING COMPANIES.

SIR,—Some time ago it may be remembered that two or three Australian mining properties were introduced on this market:—

1.—LONDON AND ST. ARNAUD (Gold and Silver).—Capital 50,000*l*., of 1*l*. each per share; vendor to have 24,000 fully paid-up shares. It would appear that all the available balance has been absorbed in what seems to be a very unsatisfactory manner—up to Dec. 31, 1873, 872*l*. London expenses; 2004*l*. colonial expenses; 10,352*l*. mining expenditure—and, so far, with what result? An advance of some 1000*l*. by a colonial bank on "bullion," which seems to chiefly consist of lead and other inferior metals, instead of the gold and silver we were taught to believe the ore contained so much of. It appears that there was a reserve of 11,000 shares left for colonial subscribers, but which they do not seem inclined to take—hence the colonial management, which absorbs so much money, seem to have little influence in the colony, because if the property was considered good it is only reasonable to suppose that there would be no want of buyers out there.

2.—NORTH COSTERFIELD (Antimony).—They are sinking a new shaft, and Heaven alone knows when and where they will tap this wonderfully rich lode. Up to the end of June, 1873, they had seen (or even later) very little of antimony, much less gold.

3.—MARINER'S REEF (Gold).—The results so far, except as regards expenditure, *nil*.

Looking at what is done at home by good practical men, with small means, it speaks badly for the prospects of colonial schemes, if such expenses are in future permitted.—*London, April 28.* S. N.

Meetings of Public Companies.

THARSIS SULPHUR AND COPPER COMPANY.

The annual meeting of shareholders was held in the Trades' Hall, Glasgow, on April 24,

Mr. CHARLES TENNANT in the chair.

Mr. JONATHAN THOMSON (the secretary) read the notice convening the meeting and the directors' report, which was published in the Journal of April 18, was submitted.

The CHAIRMAN, in moving the adoption of the report, remarked that the bright prospects which 1873 presented had not been realised, and instead of 40 per cent. they would have to be content with a dividend of 25 per cent. The property itself is in no respect less sound and valuable than it was. The mines are being proved still larger and more productive, and the management, both in Spain and in this country, is becoming always more efficient. They have had, however, to contend with a combination of adverse circumstances, and it is to these that the reduction of dividend is attributable. (A VOICE: "Questionable.") They took possession of the mines in December, 1866, and during the long period that has elapsed since that date Spain has been in a state of chronic revolution, yet have never had the slightest trouble or difficulty with their workpeople; such a thing as a strike has been unknown. In May, however, some emissaries of the International Society, strangers to the district, found their way to the mine, and brought about, almost by force, an interruption of labour for ten days, unsettling the men, and considerably affecting the output. The changes in the method of working introduced by Mr. Cowan tended in the same direction, the consequence being that almost all mineral had to be shipped, instead of the poorer being treated on the spot. The lower prices at Swansea also reduced the value of the ore in this country. These causes combined caused a diminution in the profits for the year of 68,000*l*. Precipitate from the mine, one of the permanent sources of revenue, owing to higher costs of iron and coal and lower prices in this country for copper, has given 38,000*l*. less profit than last year. Manganese, owing to smaller supplies, 4000*l*. less, and the metal works, 5000*l*. less—these sums together amount to 115,000*l*. If to this be added 18,000*l*. written off profits for San Telmo and other things, more than was done last year, 133,000*l*. is shown as the total reduction of the net profits compared with 1872. The exact figure in the balance-sheet is 133,627*l*. The additional expenditure for coal and iron alone for precipitation at Tharsis has been 17,445*l*., and the costs at the metal works, which were already much enhanced in 1872, are increased by 38,900*l*. The results at the metal works were helped to the extent of 28,000*l*. by the higher price obtained for purple ore. Owing to larger calcination and improved working generally, the results of these works, under such exceptional costs, compare favourably with those of 1872. The extraction at Tharsis from the north lode has been 290,099 tons in 1873 (in the first eight months only 172,000 tons), against 333,460 tons in 1873—a falling off of 43,361 tons; but they have got out of the centre lode 26,984 tons, bringing up the total extraction to 317,082 tons, or 26,423 tons per month. For the first three months of the current year the output has been 118,689 tons, or at the rate of 39,623 tons per month, or about 13,000 tons per month more than in 1873. They count on a total extraction for 1874 of 430,000 to 450,000 tons, of which 70,000 to 80,000 from centre lode. Their shipments will, they trust, reach 270,000 tons; and as the quantity from which to select will be much greater, they may fairly trust to get the copper contents up to at least the former standard. Notwithstanding the continuous efforts of this company for seven years, and the heavy outlay of its predecessors on the development of the opencast, the total output from the Tharsis Mines has been practically limited to about 330,000 tons. Now, however, the capabilities of extraction are such that it is estimated that 600,000 tons per annum may be raised if required. Altogether, he considered the position of the company stronger than at the date of the last meeting.——Mr. SCHAW seconded the motion.

Mr. M'CAIG criticised the accounts, and declared the report to be disappointing to the shareholders in the highest degree, concluding by moving as an amendment "That out of the alleged balance a dividend at the rate of 10 per cent. be declared, payable on May 8 next, and that a committee of enquiry be appointed to report on the whole concern before the November dividend is declared."——Dr. GORDON CARNACHAN, in seconding the amendment, said he was an investor, not a speculator, in Tharsis shares; he had bought at 44*l*. up to 50*l*. per share five or ten shares at a time, and paid for them, and when the stock commenced to fall after the last meeting followed it down to average himself. It was all well for speculators to laugh, but it was different for *bona fide* investors. He had been induced to invest by reading the report of the meeting held last year, and especially by the remarks of the Chairman on that occasion, but he now saw the folly of putting faith in limited liability companies, and many more in Glasgow were in the same position.

Mr. ROUGHHEAD wished to know what amount of profit had actually been realised for the payment of the dividend, and contended that if they had sufficient for the division of 25 per cent. they were bound to pay the whole of it now. He proposed as a second amendment that they should only divide the dividend to the amount really realised, so that they might keep strictly to the Articles of Association; but no one seconded the motion.

The CHAIRMAN said the directors would certainly not have declared any dividend unless it had been honestly earned.

The report was then adopted; Messrs. C. Tennant, A. S. Schaw, H. Deacon, and J. Wilson were unanimously re-elected, and 4000*l*. was voted to the board for their remuneration; and Messrs. Moore and Mackenzie were re-elected auditors.

At an extraordinary meeting held immediately afterwards it was resolved "That the board of directors is hereby empowered to borrow on debentures, terminable in five and seven years, such a sum as, with the present debenture dent (100,000*l*.), shall not exceed in value in all 250,000*l*., and remit to the board to carry this resolution into effect."

A vote of thanks to the Chairman, proposed by Mr. M'CAIG, terminated the proceedings.

MAMMOTH COPPEROPOLIS OF UTAH.

An extraordinary general meeting of shareholders was held on Thursday, at the City Terminus Hotel, Cannon-street,

Lord CLAUDE HAMILTON in the chair.

The SECRETARY read the notice convening the meeting.

The CHAIRMAN said as the shareholders were, of course, well aware the present was not the annual meeting of the company, nor, indeed, was it the meeting of a company under ordinary circumstances, it having been convened in consequence of the peculiar and unfortunate position that this company, representing the most valuable mining property in Utah, now found itself in. On the occasion of their last meeting, held on Feb. 13 last, the circumstances and position of their undertaking at that time had been fully explained to the shareholders, and a considerable discussion had thereupon ensued. The directors had appealed to those interested in the concern to come forward and endeavour to raise a certain sum of money which they had considered would be sufficient to relieve the company from all its embarrassments, and place it on a sound and substantial footing, so that it might be in a position to develope and work the great store of wealth that they were confident laid in their property. Some of the proprietors being impressed with the conviction that it would be most shortsighted to abandon the property, for want of a little effort to raise the funds required, had at once come forward, and had liberally contributed towards the amount required. But such an example, he regretted to say, had not been followed by the majority of the shareholders, and the amount subscribed in response to the appeal made by the directors had not amounted to more than 5400*l*.; and, as this was, of course, insufficient to relieve the company of its financial embarrassments, the directors had felt themselves bound not to take advantage of the amount subscribed. Since then time had gone on, and the board had not seen its way to meet the difficulties of the company's position. Many negociations had been going on; shareholders and their friends had met, and various schemes had been suggested and discussed, but up to the present moment, however, they had been unable to arrive at any definite line of action, and the time did not now admit of further delay. Therefore it was that the directors had felt themselves bound to call upon the shareholders again to assemble together, for the purpose of discussing and deciding what had best be done in their mutual interests. The directors individually had done as much as their own means enabled them to do, and they did trust that a more full knowledge of the real state of the property, its enormous wealth, and the small deficit between assets and liabilities, might yet induce those who were already interested to come forward and render such further assistance as would bring the company into a sound and satisfactory position. Many people had met his appeal for additional funds with the old story, that to subscribe further money would simply be throwing good money after bad. Now, never was there a more erroneous application of a sound precept than that, because the shareholders were not now asked to spend their money for the purpose of ascertaining whether their property did or did not contain the wealth that it was alleged to possess; that fact had already been ascertained and proved, to the conviction of everyone who had gone into the matter. There was not one single person who had visited the mine who did not acknowledge how valuable a property it was; in fact, it stood as one of the most valuable mines in the mining district of Utah. The question to be considered and decided that day was whether the shareholders would resolve to extricate the company from its present unfavourable position, or allow it to slip from their hands. They must not waste their time in wrangling as to whether this or that course might have been better had it been adopted in the past, but as to what policy should be pursued in the future. He understood that the general opinion was this, that if they could get the shareholders that day to agree to form a committee among themselves, to consult and co-operate with the directors as to the best method of raising and employing the funds requisite to relieve the company from its present liabilities, that that would meet the difficulty. They (the directors) were perfectly sure that, if four or five intelligent gentlemen met together, they would soon see their way to raising that which would meet all the exigencies of the case. Mr. Elliott, whose experience in all mining matters and well-known ability in that respect rendered his opinion and advice both valuable and important, had been kind enough to undertake the negociations that for some little time past had been carried on between the board and those shareholders who had taken a leading part in the affairs of the company. With the permission of the meeting, therefore, he would call upon that gentleman to make such statement as to the proposed arrangement as might seem best to himself, and he was sure Mr. Elliott would place it before them in the ablest and most business-like manner.

Mr. JOHN ELLIOTT said that since he last had the pleasure of meeting the shareholders the board had been incessantly engaged in making all the efforts in their power to extricate the company from its present position. Those efforts had only been attended as yet with partial success. But quite recently they had, he thought, obtained by negociation such additional advantages as would, he hoped, give a sufficient stimulus to raise the additional funds that were absolutely necessary—and necessary at once. He might state that the result of those negociations had been that they obtained from the vendor's representative the promise of a number of shares, representing 22,000*l*. of stock, which was to be placed at the disposal of the directors or shareholders, as might be decided, for the purpose of aiding the raising of fresh funds or of being kept as a reserve against future exigencies. The effect of that would be this—the board had sent out a proposal to the shareholders to raise 15,000*l*. additional capital, at 20 per cent., as debentures, with a bonus attached to them of two thirds the amount in surrendered shares. At that time the directors had had the offer of only 1000 shares from the vendor, therefore the further 1200 shares that had since been surrendered constituted a balance in hand, which, if the 15,000*l*. were raised, would very soon become of considerable value, because they had the most perfect assurance from their managers out in Utah that everything was ready to go to work, the only cause of the stoppage of operations being the want of funds. Therefore, if that want were supplied, it followed as a matter of course that the value of the company's stock would be thereby enhanced, for as the result of that work they might calculate upon such an amount of profit as would enable them to pay off their first and second debentures, and leave a balance for distribution on the ordinary share capital of the company. According to the deed under which the first debentures had been raised, it was stipulated that half the profits expected to be realised from the working of the mine should be applied in liquidating them. Therefore it followed that the moment the company began to realise profits and pay off its first debentures the position of the second debentures improved. Now, they were told that the furnaces alone, if they did not touch the mill, were capable of bringing in profits to the amount of 80*l*. a-day, or 20,000*l*. a-year. Compared with that sum the interest on their debentures was a very small amount indeed, and he, therefore, could not see any reason to doubt the payment of either the interest or principal of their debentures. As to the value of the mine, in all his experience of such matters he had never met with such an amount of evidence, all tending in one direction, all confirmatory of the one point that in the Mammoth they possessed one of the finest mining properties in America. For instance, in the private correspondence of one of the shareholders (he regretted he did not see the gentleman present there that day) occurred a most extraordinary statement as to the high character of the company's mine. Now, they stood in this position—Was this mine worth or not the price of the first and second debentures, and would there be any balance over, so as to induce the holders of the existing shares to subscribe to the debentures they now proposed to issue? If that were agreed to the whole amount then raised as debentures would be 35,000*l*., of which at least 20,000*l*. was the result of additions made to the works of their old mine. The board were informed on reliable authority that the mine was developed by the money that had been spent upon it to the extent of some 14,000*l*. to 15,000*l*. to the proof that their mine was a permanent one, and in the laying bare of an enormous mass of gold quartz ore, which they were further told was of incalculable value, and that so soon as they could get their mill so adapted that the results were satisfactory, which he believed was only a question of time, there was at least seven years' supply in the quartz alone, quite independent of the profit they hoped to realise from the copper. Having regard to such facts, it seemed to him preposterous to contemplate the relinquishment of their property simply because the result up to the present moment had not proved altogether satisfactory. If this mine were to be brought out now before the public he did not suppose there would be any hesitation in subscribing to it upon the evidence they could bring forward as to its great and unquestionable value. It was absurd to speak of the numerous failures that had occurred in other mining enterprises as though such failures were an argument in support of the abandonment of this property. It had been owing to circumstances entirely beyond the control of the board that this company had drifted into its present position. The sum of 1100*l*. which the company now owed represented its total liabilities. Now, the board were extremely anxious that the shareholders should satisfy themselves as to the past management of the company, and also as to the steps to be taken for its future management. With that object in view, and actuated with that desire, they had most readily fallen in with the suggestion made that a committee of shareholders should be appointed to act with the board, and to devise the best measures that could be taken for the purpose of raising the money required, and also as to the future management of the mine. They were in possession now of information regarding their property that they had never had before; they could see the causes of past failures, and they could see their way to cut down many of the expenses that had been going on out there in Utah, and which he hoped would never occur again, and they had also a better labour market (a most important consideration) than they had ever had before, for the result of the recent American panic had been to dissipate the inflated notions which had prevailed in the States ever since the late civil war. Up to the present time they had been carrying on mining operations under the greatest possible disadvantages. All those ideas as to the value of labour were now blown to pieces by the effect of the late panic, and though they had suffered greatly from them at the time he believed the result of that would be, if they raised the money now as proposed, to place the company in a better position, and they would start with a better property and with brighter prospects than they had ever had before. What the directors were most anxious the shareholders should now do was to settle as to the appointment of a committee, so that its members might at once meet and confer with the board, because time was vital in a matter of this kind, for, although they had not suffered by the past delay, inasmuch as it was hardly possible to continue mining operations during the winter in Utah, now that the summer had come every hour's delay represented a loss of profit. He, therefore, hoped that the meeting would come to a speedy and unanimous decision as to the appointment of a committee, and that this committee would cordially co-operate with the directors in the endeavour to raise this company from its present unfortunate position, and place it on a sound and satisfactory footing. (Hear, hear.)

The CHAIRMAN then read a list of the gentlemen whom it was proposed to elect as a committee. The names were—Colonel Stewart, Dr. Maybery, Mr. Tipping, Colonel Fries, and Mr. Askew.

Mr. J. ELLIOTT, in reply to a question, said that the company's indebtedness in England amounted to about 1200*l*., of which 600*l*. would be taken by the creditors in debentures. With regard to Mr. Valentine's claim of 6000*l*., which was for money lent upon the security of debentures, Mr. Valentine had authorised him to state that he was willing, if the propositions put forward by the board were agreed to, to take the whole of that in debentures.

A SHAREHOLDER: Then you would have no difficulty in arranging the English debt?——Mr. ELLIOTT: None at all.

A SHAREHOLDER: How much money is really wanted to clear the company of all its embarrassments, and furnish it with a balance sufficient to prosecute mining operations?——The CHAIRMAN: About 15,000*l*., of which we are promised 5000*l*.

Mr. TURQUAND reminded the shareholders that the question before the meeting was whether they would put their shoulders to the wheel, and endeavour by the subscription of further capital to render the company a success, or whether they would put up with the loss they had already made, and abandon the property. He He did wish to question the opinion expressed as to the value of the mine, because he found that on all hands that that was the prevailing opinion, and that it had been solely through the mismanagement or something else that the company now found itself in its present unsatisfactory position. The negociations between himself and Mr. Elliott on the part of the board had at last brought them to a point on which they were somewhat at accord. He did not think it right, having regard to the interests of the shareholders, to continue to assume the hostile position that he had at first taken towards the directors, because his own personal venture in the undertaking was small, and because he might, by so doing jeopardise the interests of larger holders. (Hear, hear.) Now, he had come to the conclusion that the compromise proposed by parties who had been interested in this mine, referred to by Mr. Elliott—the abandoning of a certain portion of interest in this mine—might be satisfactory having regard to the position of the company, because it was quite clear, if they went on contesting, the mine would have to be liquidated under a winding-up order from the Court of Chancery. He had come to the conclusion, also, having regard to the comparatively small amount of liabilities, and the reasonable prospects there were of diminishing those liabilities as far as concerned the money payment of them, that it was desirable they should all pull together, and act with perfect unanimity in the endeavour to resuscitate the company by subscribing among themselves the amount of debentures the directors thought necessary. (Hear, hear.) He was likewise of opinion that a less amount than that asked for would be of very little use. With regard to the indebtedness of the company, he thought it had been somewhat under-estimated. As far as he had been able to ascertain, the liabilities of the company in California amounted to something like 360,000—that was about 12,000*l*. That amount would, of course, be subject to reduction, owing to the fact that these liabilities were stated in currency and other causes. Those reductions, however, would still leave liabilities to the amount of 41,000—9000*l*. He did not know that he was at liberty to make statements with regard to the agents out there, but this much he thought he might say, they would be willing to to continue their account as a current account of the company, and thus avoid the necessity for immediate payment. Then there were some 80000 which were due at the mine to miners and others. With regard to that, he (Mr. Turquand) thought if the men were offered cash they would accept something less than they claimed. Thus their liabilities in California were reduced to about 40,000, which he thought they would have no great difficulty in liquidating. Next they had to consider the debt of the petitioner, who was endeavouring to wind up the company, amounting to 3000*l*., in regard to which he had been given to understand that Mr. Valentine was willing to accept debentures to the same amount. Then lastly, there was the English debt, amounting to 1200*l*., of which again the creditors were ready to take half in debentures. Now, having carefully reviewed the whole of those facts and figures, he had come to the conclusion in his own mind that if the sum of 15,000*l*. was raised, this mine might be continued with benefit to the shareholders. (Hear, hear.) In conclusion, he (Mr. Turquand) proposed the following gentlemen as members of the committee:—Dr. Maybery, Col. Stewart, Mr. Wardrop, Mr. MacDowall.

Mr. GIDEON felt that nothing could be done until a committee of investigation had been appointed, and the whole of the past affairs of the company carefully gone into. He felt certain in his own mind that things had been mismanaged from beginning to end, and before proceeding further he desired that the company's past history should be thoroughly investigated. There was not the slightest doubt that this mine was a good one, and that if properly managed it would pay well.

Mr. FRANKLIN concurred in the opinion expressed by the last speaker, that the past conduct of the company's affairs should be gone into.

The CHAIRMAN pointed out that they did not propose to tie the hands of the committee, and, therefore, it would be perfectly competent for them to make any investigation they might deem expedient. In reply to some other observations, he contended that the statements contained in the prospectus were true, and had been borne out by subsequent experience. There was one thing, however, that had been left out of the calculations of the prospectus, and that was the financial crisis that had recently taken place, and which had been the sole cause of the company's misfortunes.

Mr. H. W. SPRATT referred to the difficulties with which the board had to contend, and pointed out that the faults of mismanagement out in Utah had been utterly beyond their power to control.

After considerable further discussion, it was eventually resolved that the following gentlemen constitute the committee:—Dr. Maybery, Col. Stewart, and Messrs. Wardrop, MacDowall, Tipping, and Gideon.

On the motion of the CHAIRMAN, it was also resolved, "That a committee, consisting of the above-named shareholders, be appointed to consult with the directors as to the best method of raising and employing the funds requisite to relieve the company from its present embarrassments, and to make such investigation as they may think necessary into the past conduct of the affairs of the company."

In reply to a question, Mr. VALENTINE stated that he was perfectly willing, and even desirous, to defer his petition to wind up the company from week to week, so as to afford the committee, in conjunction with the directors, sufficient time to come to some arrangement as to what course should be adopted with regard to the future conduct of the company's affairs.

A vote of thanks to the Chairman closed the proceedings.

CANADIAN TITANIC IRON COMPANY.

The second ordinary general meeting of shareholders was held on Wednesday, at the offices of the company, No. 34, Leadenhall-street,

Mr. WILLIAM AUSTIN in the chair.

The notice convening the meeting was read by the secretary. The report of the directors was taken as read.

The CHAIRMAN, in moving the receipt and adoption of the report and accounts, expressed the wish that the few remarks he purposed making with regard to them were of a more cheerful nature than it was possible they could be under the circumstances. Their last annual meeting had been held about a year ago, and at that time Mr. McCorquodale had been appointed their general manager. That gentleman had been very highly recommended to the board by some of the greatest engineering authorities in Canada, and he possessed the great recommendation of having been the manager of charcoal ironworks previously; and he might mention that it was very difficult to find managers of ironworks who had been accustomed to charcoal, on account of the very few charcoal works that existed at the present time. When the directors had the pleasure of meeting the shareholders last autumn at the intermediate general meeting they had been then able to report that they had just lighted one of the furnaces, and were on the point of smelting iron. At that time there were indications in some of Mr. McCorquodale's letters that the charcoal was not so good as he expected, and although it was but faintly hinted it had roused in his (the Chairman's) mind a slight degree of apprehension. However, as the winter wore on they were, of course, expecting that they should be storing a large quantity of iron; they had estimated that the amount would be about 50 tons per week from each furnace, but instead of that they received accounts from their manager of very much smaller quantities having been smelted, and at last, in the month of February, they had come to a point that the furnaces had to be closed. Now, the board had constantly asked for explanations of the unsuccessful result of their operations, but they had never succeeded in obtaining any that were of a satisfactory character from their manager, Mr. McCorquodale. It appeared almost as though he had not the faculty of giving the directors an account of what was taking place, and certainly that he had not the faculty of organising matters in advance so as to inform the board what they might expect in the future, and what means they had to provide. The board, however, had felt that it was an extremely serious matter to interfere with the management in Canada while Mr. McCorquodale was struggling with the difficulties in connection with the furnaces. Therefore, they had continued Mr. McCorquodale in the management, but when, in February, they found that the furnaces had to be stopped from an insufficient supply of charcoal, and from charcoal of an inferior quality having been used, the directors thought it necessary to make some new arrangement. In the meantime they had sent Mr. Jackson to Canada as an accountant, so that they might have perfectly correct and regular accounts from the works, and thus be kept informed as to how their money was being spent, and what money they were likely to require for the future. Mr. Jackson had been very highly recommended to the board, and since he had been out he had justified the good opinion of the directors by the reports he had sent home. On finding it necessary to supersede Mr. McCorquodale, as an intermediate arrangement they had appointed Mr. Jackson as manager in conjunction with Mr. Fawcett, who was the furnace-manager, and those two gentlemen are the present managers of the works. Now, it was right to say, on behalf of Mr. McCorquodale, that he had considerable difficulties to contend with. There was no doubt that he had exerted himself during the summer of 1873 in putting the furnaces together, and in getting them ready before the closing in of the winter, but it seemed that he had not sufficient foresight. It was true there had been a large amount of charcoal stacked by his predecessor, but he states that he was not aware of what was in the interior of those stacks until he came to use them, and then he found the water had penetrated, and considerably damaged the charcoal, and, further, that the charcoal outside only was charcoal of good quality. This fuel had been received from the contractors improperly by his predecessor. Mr. McCorquodale alleged that he had been unfortunate with the winter. In those countries the winter was the time when the transport was most easy, by reason of the ground being covered with snow; but last winter had been exceptional, in the fact that there had been hardly any snow, and, therefore, they had been unable to transport the wood and charcoal in the way expected. Their manager had had also great difficulty with the native Canadians. It seemed to be understood that the procuring charcoal for a large concern like theirs would produce a great disturbance in the labour market in the country districts where the works were carried on; it seemed this had operated in a degree no one had calculated upon, the price of labour having risen very considerably. The natives had undertaken contracts in small numbers, at high prices, and then sometimes had deserted them altogether. In fact, there appeared to have been a general wish to bleed the company to the utmost; and this feeling had in fact been carried so far that some of the community had objected to the company putting two horses in one cart, because they said it prevented the employment of labour in the district to the extent that would otherwise have been the case had but one been used. Mr. McCorquodale, in the midst of these emergences, had made a contract with some contractor at Quebec, who had brought in labourers, and organised the matter so that although they had to pay a

higher price than formerly for their charcoal and wood those articles of consumption were now coming in in larger quantities than had been previously the case. The preparation and manufacture of charcoal was a somewhat complicated matter; to produce the best charcoal it was necessary to cut the trees in the winter, and lay in large stocks of timber for several months requirements. He should have mentioned earlier that the managers had succeeded in getting sufficient charcoal to re-light their first furnace on March 31 last, and they had received accounts of the production for the last three weeks. The first week the furnace had produced 26 tons of iron; the second week it had produced 20 tons; and the third week, of which they had received the account that day by telegram, 18 tons. The falling off was accounted for by the fact of the snow having interfered with their getting one portion of their ore which appeared to be smelted more easily than the rest. They hoped to be able to blow in the second furnace in the middle of May, and every week now would show them what they might rely upon producing in the future with the superior charcoal now being supplied to the company. Of course such a state of things as he had just detailed was a very great disappointment to the directors. When they called the shareholders together in the autumn of last year, and asked their approval to a scheme of raising fresh money, they had looked forward to making during the winter about 100 tons of iron per week, and they had estimated that at the close of the cold weather they would have had on hand about 2000 tons of iron, worth some 18,000*l.* to 20,000*l.*; instead of that, however, they had had no more than 200 tons. And now at the present moment they had about 274 tons of iron smelted. With regard to the quality of the iron he believed he could speak very favourably. They had had specimens of it sent to this country and had had it analysed by Mr. Riley, who he believed was the first authority on the composition of iron probably in England. That gentlemen had given a very high character to the iron, and he had seemed to lead the directors to hope that they might by a comparatively simple process effected on the spot make it into first-class steel that would command a very high price in the market. If that were so, and if they could hereafter sell this iron at the price of first-class steel, he need not say it would give a very bright prospect to their affairs. In the meantime, they had to struggle on as they could, and he should presently ask the meeting to pass a resolution to allow the directors to raise an additional sum of money in order to enable them to carry on the business of the company. He need hardly remind the shareholders that the supplying of their two furnaces with charcoal was a very expensive proceeding, and it was necessary that they should have a very considerable stock. That was absolutely necessary for the success of their business, because they must, above all things, avoid the error made by their former manager of blowing in the furnaces without having a sufficient supply to continually keep them in blast with good charcoal.

A SHAREHOLDER: Is the quality of the charcoal better?——The CHAIRMAN said it was reported to be decidedly better. With respect to that, Mr. Fawcett wrote—"Give me a fair class charcoal, and I will guarantee to make the iron, and make it pay also. I do not ask for a first-class, but a fair class, coal to do it, and I am certain I can make it pay." With regard to the quality of their iron, the board had had some interesting interviews with Mr. Molson, of Canada, who possessed some works for smelting titanic iron-sand. That gentleman, by telling them of the difficulties he had at first encountered, encouraged them as regarded their own future; at the present moment he was getting 20*l.* per ton for his iron. The idea of Mr. Riley was that, by a simple process, this company might make their iron into steel. That opinion gave them good hope for the future. Their affairs were not so bright as they could wish, but sometimes it was the darkest hour before the dawn, and he should regret if they were so downhearted as to leave the ship and permit it to be carried into port by someone else, to their own profit. With respect to the accounts, he had to state that, owing to Mr. McCorquodale's supineness they were not in proper order, but they contained all the information which was in the possession of the board at the present time. Over and over again they had requested their late manager to forward them the accounts of the business, &c., but those instructions had been disregarded. In conclusion, he desired to mention that Mr. Shore, one of their body, had consented, at very great personal inconvenience, to go out to Canada. He was a gentleman of large means, a very good man of business, full of energy, and he was a very large shareholder. He held 4000*l.* in shares, and 2000*l.* in debentures. He had gone out with the view of organising matters, and he (the Chairman) looked with great hope and confidence to what he would be able to effect. The Chairman then formally moved the adoption of the report and accounts.

Mr. CANDLISH seconded the resolution.

After a few unimportant remarks from Mr. Wade, to which the Chairman replied to the satisfaction of the meeting, the resolution for the adoption of the report and accounts was put and unanimously carried.

The CHAIRMAN, in answer to a question, stated that their colleague, Mr. Shore, sailed for Canada on April 23.

The CHAIRMAN next moved "That the directors be authorised to borrow for the purposes of the company a sum of money not exceeding 10,000*l.* in addition to the 25,000*l.* which they have the power to borrow under the Articles of Association."

A SHAREHOLDER asked at what rate of interest the board proposed to raise this additional capital.——The CHAIRMAN replied they should endeavour to obtain the money on the most advantageous terms possible. It was so difficult to obtain money that it would be a great favour on the part of anyone to advance it.

Capt. WEATHERLEY seconded the proposition.

A SHAREHOLDER enquired if the amount proposed to be raised would clear off all the company's liabilities? On the last occasion when the shareholders had sanctioned the raising of fresh capital it had been stated that that sum would be sufficient to pay off all the amounts then due, and enable the company to continue its operations on a satisfactory footing. Now, however, they appeared to be again in pecuniary difficulties.

The CHAIRMAN replied that the entire stoppage of furnaces during the winter had been the sole cause of their present unfortunate position.——A short discussion then followed as to how, if at all, the position of the present debenture-holders would be affected by the raising of fresh capital. Eventually, in reply to Mr. A. R. Johnstone, Mr. NEEDHAM, solicitor to the company, stated that the company had no power to dilute those debentures, they were a first charge upon the property, and no subsequent capital or stock could assert a claim prior to them.

Mr. RILEY briefly addressed the meeting with regard to the quality of the iron on the company's property, which, as stated by the Chairman, he had carefully analysed. It was very similar to Norwegian iron, though superior, inasmuch as it was made with charcoal. He believed they would find it take the place of metal that was the first process in the manufacture of the best Yorkshire iron. The composition of the company's iron was very similar to that. The starting of two furnaces for two months and then blowing them out must have occasioned the company very serious loss, and to his mind accounted to a great extent for their present unsatisfactory position. He thought it was very possible they might make steel from their ore, and he had suggested to the directors the process he should recommend them to try with that object.——The resolution was then put and carried.

On the motion of Mr. JOHNSTONE, seconded by Mr. STIRLING, the retiring directors, Messrs. W. Austin and J. W. Adamson were re-appointed, and the auditors having been similarly re-elected for the current year, the proceedings were brought to a close by a vote of thanks to the Chairman.

CHONTALES CONSOLIDATED MINING COMPANY.

The half-yearly general meeting of shareholders was held on Thursday at the City Terminus Hotel, Cannon-street,

The Right Hon. the Earl NELSON in the chair.

Mr. J. J. TRURAN (the secretary) having read the notice convening the meeting, the report (which was fully noticed in last week's Journal) was taken as read.

The noble CHAIRMAN said, in moving the adoption of the directors' report, he would have very little to say to the shareholders, because the report itself was a rather longer one than usual. He was very pleased to have to congratulate the shareholders on the fact that the company was at last out of debt, and that whereas at the last meeting some shareholders were lamenting that the directors should have been obliged to borrow money to carry on the expenses through the month, now they had actually got a deposit at the bankers amounting to 1500*l.*, and a better balance at the mines than at last meeting, a balance which the manager considered perfectly sufficient. The directors had been rather in hopes that a special report would have been drawn up by Mr. Smeddle, but the shareholders would see that the two letters from Mr. Smeddle, which the directors were able to give with their report, was to all intents and purposes a report. That was to say, that in the report from Mr. Smeddle presented to the shareholders at the last meeting under the headings of the different mines certain operations were mentioned. In these letters Mr. Smeddle carried on his report of the operations, and the shareholders by referring to them would see what he had expected to do, and what had been done. For instance, in the San Sebastian; in the previous report Mr. Smeddle stated that there was another lode to the south of that at present working not yet proved. He now stated that the cross-cut from the No. 1 level had intersected the south lode at 102 ft.; that it was about 8 ft. wide, but at present poor. This showed that he was really carrying out what he stated in his former report he would do. Then, in his report of the San Benito East, he stated that by driving a new cross-course he would be able to get the lode 40 ft. deeper than the level was then. Then in his letters the shareholders would see that he had not yet cut the lode, and that the country through which they were driving was very hard; the end of the cross-cut was now under a straight line between two points where the lode was known to be, so that he could not be far from it. And in his second letter on the subject he stated that "the cross-cut is now beyond the line of section, but the country continues hard, and slow progress is made. I think there is little doubt we shall strike the lode this month." This showed as much as if he had given a report that he was continuing the same work, and he (the Chairman) did not think they had lost much in not having a separate report. Mr. Smeddle must have overlooked a note in the letter sent to him giving him a reminder that unless he wrote by that particular mail he would miss the present meeting. The only thing in his letters that was at all disappointing was about the San Benito West, which some people had thought a great deal of, and the directors had certainly had an idea that when the crusher came to be used that some of the hard rock which had to be dealt with would show a better yield; but it appeared from the trials which had been given it in this last month's working that it had not yielded so much as had been expected, and that it had been—for a time at all events—abandoned. If there was anything else which the shareholders wished to ask him about he would be most happy to answer any questions that might be put on the subject of the report, and the letters from Mr. Smeddle; but before he proposed the resolution for the adoption of the report he would ask the secretary to read the statement of accounts up to Dec. 31 last, which had been drawn up. It was not, of course, audited, as this was not the meeting for passing the accounts.

The SECRETARY then read the statement of accounts, which showed that the total expenditure was 32,822*l.* 13s. 6d.; the London expenses, &c., 2112*l.* 19s. 11d.; and that the balance in favour of the company was 4712*l.* 16s. 4d. The profit and loss account for the six months was embodied in the directors' report.——Mr. PARKE PITTAR rose to second the reception and adoption of the report and accounts.

The noble CHAIRMAN then said he would be very happy to hear any remarks.

A SHAREHOLDER said the report was so satisfactory that he did not feel justified in making many remarks. The difference in the state of things was very satisfactory indeed, and he thought Mr. Smeddle's estimate was that it would require 5 dwts. of gold per ton of ore to make the company a prosperous one, but they had only at present had 4½ dwts., which showed a very good result. He thought at the next meeting the directors would be able to give the shareholders a dividend, and then the shareholders would be still better pleased.

Mr. C. S. HILL remarked that during the last month they were unable to get into the San Domingo Mine, as repairs were necessary. If this had not been the case a better result would have been shown.

The SHAREHOLDER said he was not complaining at all, he merely wished to express his satisfaction.

The noble CHAIRMAN said he thought Mr. Smeddle had always expressed a belief that when the concern was in full swing, and the reduction of the expenditure carried into effect, that 3 dwts. of gold per ton of ore would pay. He stated in October, 1873 (at the last meeting), in reference to San Domingo, that he did not expect to obtain a yield under 3 dwts, and that that would pay; and he said in another place that that percentage would cover costs. The latter statement was made in November, 1872; and to show how trustworthy Mr. Smeddle was, he would refer to the report of the directors, which stated that the cost of breaking, raising, and dressing the ores, including the management at the mines and in England, was 4284*l.* 18s. 1d., or 8s. 1d. per ton of stuff, whilst the value of the gold extracted was 7001*l.* 2s. 9d., showing that on the output of 1900 tons of ore per month an average yield of 3 dwts. would more than cover all expenses, whilst with an increased quantity of ore this cost would be proportionately reduced; this showed how Mr. Smeddle's statements were to be relied upon. There was one other thing he wished to mention. It had been found that the stone-breaker required a considerable power to work it, and as there was no available water-power in the dry season, the directors were very anxious, if possible, to leave the stone-breaker idle until the wet season, so that the two steam-engines might work the greatest number of stamps.

A SHAREHOLDER supposed that all the machinery requisite for the proper working of the mine was now at the mine, and that there would be no more delays on account of delays by carriage, &c.

The CHAIRMAN replied that all the machinery that had been sent out had arrived at the mine, and was now at last in working order. There had been delays, which had been explained at the last meeting. If the machinery did not arrive in that country before the wet season two or three months were lost, and that was the reason why better returns were not shown sooner. But all the machinery ordered was now at the mines; and what was more, he was inclined to think that they had at San Domingo all the stamps that they could expect to work properly with the water-power and the engines they had now got. At one time the directors were asked to send out 72 heads of stamps, but he was perfectly convinced from experience that they would not be able to work much more than their present number at that point. Mr. Smeddle had suggested that it would be a good thing to try pneumatic stamps. They had a water-wheel at Estrella that was put up in the old company's time, but had never been used, and as it was standing idle Mr. Smeddle suggested that the water-wheel could be utilised, and, therefore, the directors had ordered two of these pneumatic stamps. They were sold in pairs, and their work was stated to be equal to six revolving stamps. It was hoped that these would be ready in June or July. Feeling the great importance of getting them there before the wet season, the directors tried to get some second hand ones, but he believed there was only one pair sold in Cornwall at that time, and they were sold before the company had a chance to buy them. However, they had one benefit, of having all the latest improvements.

A SHAREHOLDER asked if they would leave England in June or July, or whether they would reach the mines in one of those months?

The CHAIRMAN said it was from England Messrs. Harvey and Co. (the makers) had promised if they possibly could to get them ready by June 14, but they could not pledge themselves to do so. There was a good deal of special work to do in making them.

A SHAREHOLDER enquired if this work could be done without further working capital?——The CHAIRMAN replied in the affirmative. The cost of the two stamps, with the extra duplicate parts necessary to replace the parts which would wear away sooner than the others, and paying 100*l.* for carriage, would only amount to 350*l.*

A SHAREHOLDER said he would like to know the views and intentions of the directors with regard to the Pavon Mine, for he understood that the ores of the Pavon Mine were the very cream of the property. And he had heard that the Javali Company had been working on ore worth 6 or 7 dwts. of gold per ton, which was above the value of the ore raised by this company. It appeared to him to be rather a mistaken policy to postpone the working of the best part, and he thought attention should be turned to the Pavon Mine, where he believed there was very rich ore. He had no doubt whatever that a satisfactory explanation could be given on this subject.——The CHAIRMAN said if the shareholders would turn to one of the letters of Mr. Smeddle (which was written in answer to some remarks from the directors) he would see the explanation. Mr. Smeddle stated, "With reference to opening Pavon, I would propose that these mines (the upper mines) be first made as complete as possible; we have a quantity of ground here which can be opened at a much less cost than the lower mines; it will be necessary to have a separate staff for the latter, erect buildings, &c., whilst we can work the whole of these with our present staff."

The SHAREHOLDER thought the explanation was very satisfactory; if he had understood the matter he would not have troubled the Chairman with his remarks.

The CHAIRMAN said the directors did not feel themselves in a position to ask for more capital to open the Pavon Mine at present; but if the other mines were carried on, as Mr. Smeddle expected, by paying costs with 3 dwts. of gold per ton of ore, they might then be in a position to open the mine much more easily than they could now.

A SHAREHOLDER asked for information respecting the 1500*l.* mentioned in the last paragraph of the directors report as being on deposit. There appeared to be about $10,000 or $12,000 (2200*l.*) on the other side. He would also like to ask what was the balance at the bank on current account? He supposed it was only a small sum?

The CHAIRMAN said the amount was a very small one, and was a little smaller than the directors meant it to be, because the last sale of gold had not realised quite so much as had been expected. The cash in England amounted to 1608*l.*, and, therefore, as there was 1500*l.* on deposit, the sum at present at the bank was 108*l.* The manager's balance on the other side, on March 16, was 2193*l.*; specie in transit, 1080*l.*; and sundry open accounts, 367*l.*; making a total of 5248*l.*, with no liabilities.

A SHAREHOLDER said, with a view of the importance of keeping a good supply of labour at the mines, he would like to ask whether attention was being paid to the housing of the men? He knew there was a difficulty sometimes, and he felt sure that in Nicaragua, as elsewhere, the matter of labour was one of great importance.——The CHAIRMAN replied that a native town had now sprung up close to the mines, and, according to the natives' ideas of comfort, they were very well lodged. The natives would not go into "model lodgings" if the company built them for them. The men stayed all right with the company in ordinary times, but when there was a war, by the rules of the country, they could be laid hold of. The company tried to evade that law on the last occasion of a war, and actually paid a sum to the Government to free the company's men from being pressed. But the men had not overcome their fear of being taken, and some of them ran away; and the company had, therefore, discontinued that sort of thing, as it did not pay. The question was not one of accommodation. About the Estrella affair, it had only at present been an experiment, but Mr. Smeddle had been asked to give an opinion on the subject, and he thought the pneumatic stamps would be a great improvement. If this turned out well it would be a good pattern to adopt for developing the Pavon Mine, when they came to do so. There was still a sum of money uncalled, which the directors had no idea of calling at present, as they did not foresee any great outlay before they came to deal with the Pavon Mine.

A SHAREHOLDER enquired if there were not some unallotted shares?——The CHAIRMAN said there were, and a call of 2000*l.*, less 200*l.*, paid in advance. About the labour question in the wet season it was a difficult matter, because a great many mines had sprung up in the neighbourhood which had not got steam power to work in the dry season, so that in the dry season this company gets on very well; but in the wet season all the mines were employing labour, so that the matter became a difficult one. The directors had enquired about Chinese labour, but they found that in the first place they would have to guarantee so much per head for ensuring their return at the expiration of their contract, and have to pay the men 8*l.* per day. They then tried English labour, but it had been found too expensive to get men out there, probably 40*l.* per man.

A SHAREHOLDER asked if the pneumatic stamps were cheaper as well as more efficient than the others?——The CHAIRMAN, in reply, said in one sense they cost more, in another they were cheaper. The actual stamp for stamp costs more, but two pneumatic stamps were supposed to do the work of six revolving. A great recommendation to adopt them was their lightness, and the ease with which they could be got to the mines. A committee of directors was formed to see the stamps at work.

Mr. HILL said Mr. Taylor at the Pesterena meeting the other day said his experience of the pneumatic stamps was a most satisfactory one.

The motion for the reception and adoption of the report was then put to the meeting and carried unanimously.

Col. WELLER proposed, and Mr. PEAK seconded, a cordial vote of thanks to the noble Chairman.

The motion having been carried *nem. con.* the proceedings terminated.

CEFN BRWYNO MINING COMPANY.

The general meeting of shareholders was held at the company's offices, Austinfriars, on Wednesday,

Mr. STAUNTON in the chair.

The LONDON MANAGER read the notice convening the meeting, and the accounts, showing a balance of assets over liabilities of 54*l.* 10s. 4d., together with the agent's report, were submitted.

April 23.—The 104 is now extended 80 fms. east of engine-shaft, on a lode varying from 3 to 9 ft. wide, which produced good stones of ore at several points in the first 14 fms. of this drivage. For the next 36 fms. the lode was of a most promising character, and produced for nearly the whole distance from 18 cwts. to 1¼ ton of lead ore per fathom, and in some places was worth 2 tons per fathom; from this point it contained ore in places, and in the last 3 fms. of driving has produced 12 to 15 cwts. per fathom. In taking down the lode yesterday to the present end we found it to be steadily improving, now 5 ft. wide, of a very promising character, containing beautiful spar, and worth full 1 ton of lead ore per fathom, with every indication for further improvement. This end is now entering the ore ground seen at the level above, and we may expect to open out a good run of ore ground here. A winze has been sunk from the 92 to the 104, 50 fms. east of shaft, and a great portion of the ore ground over the 104, west of this winze, is taken away from where our returns latterly have principally been got. Here we have two tribute pitches, let to four men in each, at 8*l.* 5s. per ton, the lode producing 18 cwts. of lead ore per fathom. A pitch is also let to eight men, over and below the 80 and 56, at 8*l.* 5s. per ton; lode worth 18 cwts. to 1 ton of lead ore per fathom. These are the chief points of operation at present, from which we have lately been making a small profit, and should have made more had we been able to obtain sufficient men on tribute. The high wages given at the coal and iron mines have made men scarce here. The falling off in the produce of the lode at the 92 west, as previously referred to in my reports, when compared with what it was in the 80 above, where there was a great length of good ore ground taken away, has been the reason why more ore has not been raised, and better results attained up to the present time. There are several points still in the mine that are well worthy of being proved, and I would recommend for the present that the following be carried out:—To sink the engine-shaft, which is now already down 3½ fms. below the 104, for another 12 fm. level, and then extend the level eastward into the ore ground seen at the 104, and also to drive the same level west, which would be 24 fathoms below the 92, at the bottom level in that direction, and where there is a lode worth 1¼ ton of lead ore per fathom seen gone down for about 20 fms. long, and which may be found more productive again at that depth. To drive the 80 east where there is only a few fathoms to get into the good ore ground seen gone down in the bottom of the 56, and which is about 15 fms. long, and if found so productive as at that level a good deal of ore will be raised, there being 24 fms. of backs for stoping. The 56 east is also a point that should be extended in search of fresh deposits of ore, and in which direction there are good chances of such being found, and a discovery here would be of great importance, it being in virgin ground, and about 90 fms. below the surface. By carrying out the above-mentioned work I fully believe the mine will again prove productive, become remunerative, and well repay the shareholders for a further small outlay. The machinery is all in excellent working order, and we shall sample 20 tons of lead ore on Tuesday next, the 28th inst.—JAMES PAULL.

The CHAIRMAN said that he had really nothing to add to what was contained in the report; for although the mine no doubt warranted further trial, their financial position was such that they could scarcely hope to be able to raise the additional funds required. Capt. Paull was present, and would give the shareholders any information they might desire, but the business of the meeting was really very limited, consisting only in the passing of the report and accounts, the re-election of a retiring director, and the appointment of an auditor. He would, therefore, propose the first resolution, "That the report and audited account be received and adopted."

The resolution being seconded, was put to the meeting, and carried unanimously.

Mr. HALES proposed the re-election of the Chairman as director, and remarked that as Capt. Paull was present it would be well for him to state what was the present position and prospects of the mine, and also how much additional capital would be required.

Capt. PAULL said that they were not making a profit, it was true, but the prospects were such that he certainly considered the mine worthy of further development, if more money could be raised.

Mr. BULLER presumed he referred to the lowest level—the 104.

Capt. PAULL said that he did. They had now a very good lode in the 104 fm. level going east, and it was also desirable to drive westward. Indeed, the prospects of the mine altogether were very good, but a little more money was necessary. The 104 east was at present worth 1½ ton per fathom.

Mr. PYNE said that as to the amount of money required it would be from 3000*l.* to 4000*l.* They had hoped that the 104 fm. level would have opened out in such a manner as to have enabled them to raise the necessary funds, but the improvement had not taken place so soon as had been anticipated.

Capt. PAULL remarked that since the report was made there had been a considerable improvement, the end being worth 1½ ton per fathom now instead of 1 ton, as stated in the report. The machinery and plant, moreover, were in good order.

The CHAIRMAN was afraid that this company was not in a position to raise more capital, and thought the only course would be to sell to another company, if that could be arranged.

Mr. MURCHISON remarked that there were but 33 shareholders in the present company, and the number of shares was small.

Mr. BULLER suggested that it would be better to defer all consideration of the subject until they saw what the 104 fm. level turned out.

Mr. Staunton was then re-elected a director, and the auditor was re-appointed, and 5*l.* 5s. voted as his remuneration, the proceedings terminating with the usual complimentary vote to the Chairman. ——

ROMAN GRAVELS MINING COMPANY.

A general meeting of shareholders was held at the offices, St. Helen's-place, on Wednesday,—Mr. ROBERT WILSON in the chair.

Mr. F. R. WILSON (the secretary) read the notice convening the meeting.

The report of the directors and manager (which appeared in last week's Journal) were taken as read.

The CHAIRMAN said the directors had much pleasure in meeting the shareholders at this the fourth ordinary general meeting of the company, and to congratulate them upon the increased prosperity of the mine, as shown by the balance-sheet and the report of Capt. Waters. It would seem that the profit during the past 12 months had been 23,599*l.* 7s. 4d., out of which the directors had declared dividends to the amount of 20,407*l.* 10s., carried 3000*l.* to reserve, leaving an increase balance of 551*l.* 17s. 4d., as compared with last year. When on the mine, at the commencement of the present month, he was much pleased with the extraordinary progress that had been made in the surface improvements and extensions since his last visit to the property; indeed, everything now was nearly complete for dressing a very much larger quantity of ore than at present returned. Capt. Waters would tell them he would be able soon to considerably increase the returns; the price of lead had somewhat declined, but, notwithstanding this, no doubt whatever need be entertained that equal, if not better, results would be realised during the current 12 months than had been the case in the period embraced in the accounts now before the meeting. He then moved that the report and balance-sheet be received and adopted.——Mr. T. C. MUNDEY seconded the proposition.

Mr. GEACH asked when Capt. Waters calculated he would be able to increase the returns?——Capt. WATERS said he had gone into that matter with the board at the meeting just concluded, and it had been decided that the returns should not be increased until August—not that they could not commence at once, but because it would be more cheaply done by-and-bye. In hard ground and a wide vein large rocks of stuff were thrown down, and unless they got the stuff under the men's feet to work on the cost of working would be much more expensive: by-and-bye they would be able to have a much larger quantity of stuff, and still keep a larger quantity in reserve under their feet, and thus avoid the expense of timbering. But in August the returns would not be increased by a paltry 20 tons per month, but to the even figures mentioned in his report: the plant and machinery being fully equal to the return of 300 tons per month. (Hear.) He then pointed out upon the section the various points of operation as detailed in his report. He stated that the great bulk of returns up to the present time had come from the back of the 65. It was with him a matter of doubt whether the ore-bearing part of the Roman lode had yet been seen above the 50 fm. level; their plan would be, when a little more light had been thrown upon the point, to cross-cut from the 50 fm. level.

Mr. GEACH suggested that a reduced section of the mine should be forwarded to the shareholders.——Mr. WILSON said it had already been determined to do so.

Mr. ALINGTON asked if the mine were at all times provided with an ample supply of water?

Capt. WATERS said that, supposing they had to depend upon their own independent supply, they would sometimes run short; but Mr. More had very kindly repaired a large reservoir between Ladywell and Roman Gravels, and there were now six men making a trench: by this means they would have an ample water supply—indeed, there was now water enough in the pool to serve them all the summer.

Mr. GEACH understood from Capt. Waters's statement that when the returns were increased they would be 300 tons per month?——Capt. WATERS: Yes; the dressing-floors, now ready, were capable of dressing 500 tons per month.

A SHAREHOLDER asked if there was any doubt about the increased returns being kept up?——Capt. WATERS did not think there was any doubt whatever. Had he not been told not to repeat what he had so often said, that he more and more believed Roman Gravels would be a rich mine for generations to come, he might now say something more upon the subject.

Mr. YORK asked if any attention had yet been given to the slimes?——Captain WATERS said it was his intention to re-work the whole of the slimes; he knew there was a very large quantity of lead in them, but he wanted first to get the floors on the other side of the road on a level with the old floors, so as to make use of the same water.

Mr. WILSON, in reply to a question, stated that Mr. More had taken a great deal of trouble in obtaining the consent of the landowners for a line of railway to serve the different mines. The Snailbeach Mine had agreed to subscribe its portion of the necessary capital, and Mr. More thought it ought to be made to pay 10 per cent. upon the outlay.

Mr. PETER WATSON enquired if the lode in the 65, which was reported to be "squeezed up," was likely to improve?——Capt. WATERS said the 66 fm. level was now worth over 4 tons of lead per fathom: a splendid lode all the way. In going through the Sawpit vein it was a little smaller, but was now looking splendid, and would further improve.

Mr. PETER WATSON said it must be exceedingly satisfactory to all connected with the mine to see the marvellous and extraordinary manner in which it continued to unfold its apparently exhaustless resources. After it had been successfully worked many years since almost from surface it remained dormant for the greater part of a quarter of a century, when it was taken in hand and partially developed by the late company. Notwithstanding it had fallen to the lot of the present shareholders to possess such a rich mine, it must not be forgotten that when this company took possession neither its returns nor value were in any way comparable with those at the present time. Since it had been entrusted to Capt. Waters' management shafts and winzes had been sunk and levels driven, and in a short time would be disclosed one of the richest courses of ore ever seen in any mine—at least in Shropshire—worth 15 tons, or a money value of something like 200*l.* per fathom, and that was only entering upon the rich bunch of ore which the former proprietors wrought. It must be satisfactory to know that there was a large and increasing amount of reserves, and that when the ventilation was made complete at the 80 there would be a large additional section of ore ground to be taken away. All this was done, and the mine yet only in its infancy, for the deeper the explorations the more productive and rich did the mine prove. To have developed a mine in such a manner, rather with a view to its future permanence than to its immediate present, was indeed no child's play, but they were told the resources already in course of development would perpetuate its successful existence for generations to come. (Hear.) Capt. Waters had informed them that he would be able in August to increase the returns to even the amount mentioned in his report. Now, the amount there mentioned was 300 tons per month: some experts who had inspected the mine distinctly state that the returns should be 400 or 500 tons per month, and even more, but shareholders might rest perfectly satisfied if it were to the true interest of *bona fide* shareholders to make such return at once it would most certainly be made. (Hear, hear.) Having unbounded and implicit confidence in Capt. Waters, let him continue to develope the property in his own way, which could not fail to the perfect satisfaction of every shareholder. (Hear.) As the auditor, he (Mr. Watson) had carefully investigated the accounts, and it afforded him much pleasure to testify to their correctness, and the efficient manner in which every financial detail continued to be carried out by their secretary. When at the mine on Saturday last he ascertained that all liabilities had been charged up. It might be satisfactory to all the shareholders to know that the great outlay hitherto incurred at surface would now gradually diminish, and although that several improvements and extensions had taken a long time, they had been completed in the most satisfactory manner, reflecting the highest credit on the engineering skill of their manager.

Capt. WATERS said: It is with feelings of pleasure that I meet you here to-day at the third annual meeting of the company. At the

commencement of your career considerable promises were made, which on the first annual meeting you considered had been realised as far as we had then gone. Twelve months ago the statement of accounts presented to the shareholders, and the elaborate report I had the honour of submitting were received in a way that convinced me I was still credited with your full confidence, and I went back to the mine intent upon calculations as to what the wheel of fortune would revolve at the end of another year, and with what language I should be able to meet you on the present occasion. Well, then, here I am, willing to take a retrospect of the past, ready to explain things connected with the present, and, if needs be, tell you what the future of the company is likely to be:—

The first year profits were made	£6,225	0	0
Second year " "	13,370	0	0
Third year " "	20,047	10	0
Paid dividend to end of February	5,100	0	0
Paid out of revenue to capital account	3,000	0	0
Total	£47,742	10	0

or more than half of the capital of the company paid back in a little over three years. It has been said we have done too much in the time, and now it would seem we have not come near to what some clever men think we ought to have done. My reply to such criticisms is that so long as I am the company's engineer I shall have the mine developed in the way I consider most conducive to the permanent interests of the company, and not to suit market operations. We have gone on increasing the returns every year, and no stone will be left unturned to make the mine yield to the utmost under fair, honest, legitimate mining. I am obliged for your vote of thanks.

The report and balance-sheet were received and adopted.

Mr. R. Oldrey was re-elected a director. Mr. Peter Watson was re-elected auditor.

Votes of thanks were passed to the Chairman, directors, and the officers of the company, which closed the proceedings.

QUEEN'S SILVER-LEAD MINING COMPANY.

The first general meeting of shareholders was held at Oldham, on April 23,—Mr. WM. GEDDES, chairman of the directors, presiding.

The circular calling the meeting and the cash account having been read, the CHAIRMAN gave some particulars of the mine, stating that it contained the Old Milwr and Seven Star lodes, both rich in ore, and running from west to east, while these were crossed by the Golch Hill, Holway, Old and New Pant-y-ne, and other lodes running north and south. The mine has been worked from two shafts on the Milwr, connected in the 100 yard level, and having separate workings at 80, 100, 120, and 140 yards east and west. The operation of the company hitherto had been in clearing the various levels of the debris left by the former owners of the mine. They had, at the same time, been extending the levels, and were now getting on the 80 and 120 yards east. They had also sold one lot of 5 tons, and another lot was nearly ready; he also stated that he had received independent testimony from various persons who knew the mine as to the wealth which it had realised to its former owners. He expressed his good opinion of the mine from four visits which he had made to it, and examinations of the various levels. He intimated that it was the intention of the directors to put down an engine, with crushing and cleaning apparatus, as soon as they had lead in abundance to keep the machinery in full operation, and that from the cash account read they would see that the expenses incurred in floating and working the company was very light—in fact, the allowance to the directors when visiting the mine made it the hardest days' work and least remunerative other than in the desire to make the company a success. After some further remarks on the appointment of new directors, he said the old ones had determined to leave their re-election to the meeting, and mentioned some who desire to retire.

The cash account being passed, several questions were asked by the shareholders, and answered to the satisfaction of the meeting.

It was proposed by Mr. GREAVES, and seconded by Mr. BROADBENT, that the number of directors be reduced to six.——The names of several gentlemen of the old board were nominated as directors, and eventually it was moved by Mr. GREAVES, and seconded by Mr. RICHARD HARGRAVES, that the board consist of six persons—Wm. Geddes, Benjn. Fielding, Jas. Firth, John Hall, H. L. Hargraves, and Rev. D. Jones, and carried.——Messrs. T. Broadbent and J. F. Wood were then appointed auditors.

The CHAIRMAN intimated that the retiring directors had resolved not to receive the amount of remuneration they were entitled to by the Articles until a dividend was declared, and desired the meeting to fix the amount which they should have for their past services, when it was resolved that 10*l.* be given them.

It was resolved that from that date unpaid calls should be charged interest at the rate of 10 per cent. A vote of thanks to the Chairman brought the meeting to a close.

WHEAL MARY TIN MINING COMPANY.

An adjourned general meeting of shareholders was held at the offices, King William-street, on Tuesday,

Mr. GILBERT HAMLEY in the chair.

It was mentioned that at the meeting (of which this was the adjournment) Mr. Thompson and his co-directors and the manager, Capt. Parkyn, had resigned; and that at this adjourned meeting new directors were to be elected.

Upon the proposition of Mr. WHITEFIELD, seconded by the Rev. Mr. PINNEY, it was unanimously resolved that Sir E. Pearson, F.R.S., Sir G. Innes, and Messrs. T. S. Smith and J. Corby, C.E., be the directors, to whom power was given to appoint the secretary and agent.

Mr. WHITEFIELD said they had now responsible directors, who would represent the shareholders.

The following report was then read:—

In giving you a full report and description of your property I will first describe the north lode, which we met with near the surface, and was from 12 to 16 ft. wide. We have driven a level from the stamps to intersect this lode, and have laid down a tramroad, so that the tinstuff is conveyed from the lode direct to the stamps. Going east of this cross-cut level the lode is heaved north by a slide about 10 ft., and is changed in appearance and size, and is now about 4 ft. wide. This has been a throwback to us, as we had to cut out more ground, so as to get away the lode-stuff to the stamps, and only having one point of operation we have not been able to keep the stamps constantly at work. This is a most important lode, and should be sunk on at once (say) 20 fms.; the ground is easy for sinking, and could be done cheap.—Plexy Lode: This lode is in an open stope of china-clay, and is 4 ft. wide, and many hundreds of tons of lode stuff are broken from this lode waiting a tramroad to be laid down from the stamps, so that it might be wound up and conveyed into the stamps. The lode is by far the richest in the mine, and from present appearances it would appear that the supply is immense, and it could be broken very cheap. I beg to say that this lode has been spoken off in the highest terms by Capts. Tregay and Pope, who have been on the mine two or three times. We have had a few tons of the lode stuff carried up and stamped, and find it rich for tin. We could not send any large quantity, having no cart-road. It was proposed to lay down a tramway here, and erect a winding cage at the end of the stamps-axle, which I would recommend being done at once.—South Lode: We have sunk on this lode about 5 fms. below the surface; the lode is 4 ft. wide, and will pay well when it is properly laid open. A shaft should be sunk and a horse whim erected for drawing the tinstuff to the surface.—Middle Lode: We have two or three lodes, which we call middle lodes, being between the north and south lodes; here we have sunk an engine-shaft 14 fms. deep, which was necessary for water for the engine and stamps, as well as proving the lodes, &c. I find these lodes to be from 6 to 7 ft. wide, and containing a sufficient quantity of tin to pay well for working. These lodes are laid open in Mr. Brown's china-clay work 12 fathoms deep, and there are now many hundreds of tons of good work for tin washed out, and lodged at a convenient point to be sent up a tramroad. I would recommend an incline-road to be laid down here at once, and a horse-whim to wind up the tinstuff, which could be done cheap, and with the incline at the Plexy lode, and the tram-road laid down already at the north lode, almost any quantity could be sent into the stamps. You will see by this report you would have several points of operation, which you must have to make large and profitable returns. I consider your property is most valuable, having such large quantities of tinstuff so near the surface. If my recommendation be carried out you will have a lasting and a profitable mine. The 24 stamps work well, and the engine and tin dressing-floors are well laid out for dressing large quantities of tin.—THOS. PARKYN.

The Rev. Mr. PINNEY asked if the stamps referred to in the report had been in constant work?——Capt. PARKYN said they had not been at work since March 6, but several tons of tin had been sold.

Mr. THOMPSON explained that there were 1340 shares unallotted, and it had been proposed, subject to the approval of the shareholders, that some part of those shares—say 500—should be issued at 3*l.* per share, which, if taken up (and he and his friends were prepared to take them up), would give them ample funds for all their requirements. Unfortunately a contract had been entered into with irresponsible parties for the construction of the machinery, which had caused considerable delay and expense, and but for which, he fully believed, the mine would now be in a dividend-paying condition.

Mr. BRINKWORTH complained that reports from the mine had not of late been published.——Mr. Thompson said the reports were always sent to the *Mining Journal*.

Mr. BRINKWORTH asked what was the present position of the company?

Mr. THOMPSON said the mine was provided with machinery, stamping-gear, and pumping-engine; all that was wanted was the tramroad, which would cost a few hundred pounds, to the Clay-pit lode, where there many thousands of tons of very rich tinstuff, sufficient to keep the stamps at work for many months.

Capt. PARKYN calculated that there were two places at Clay-pit which would keep the stamps going for two years.

Mr. THOMPSON said that without this tramway they could not render their produce commercially valuable, although by its means it would be made immediately available.

A SHAREHOLDER asked why a statement of the accounts had not been sent out?

Mr. THOMPSON said he had not felt himself justified in sending out a balance-sheet without some authority, but that no doubt would be the first thing to which the present board would direct their attention. As he had already said, all that was wanted was a few hundred pounds to complete the tramroad, which he could see his way clear to provide. He showed his confidence in the mine by having undertaken to take up every share required to the extent of 2000, but had been persuaded to forego his claim, and become a creditor for the amount, so that the shares might be issued at 5*l.*, which it was presumed they were worth after the discoveries had been made. Their great fault had been in fixing the price of the shares at so high a figure, at a lower price every share would have been taken up, the tramroad completed, and the mine now in a dividend paying condition. He would take all the remaining shares at 1*l.* per share. Capt. Tregay, who knew the mine well, and one of the most scientific miners in Cornwall, had taken 100 shares, and spoke most highly of the mine. All that was wanted was application and energy, and little more capital, and an agent who could devote his whole time to the mine. He (Mr. Thompson) was quite satisfied if he were there he could work the mine to a splendid profit. Capt. Parkyn had offered to work the mine at 13*s.* 4*d.* tribute.

Rev. Mr. PINNEY said there did not appear to be any diversity of opinion about the value of the mine.

Capt. PARKYN said that each of the 24 stamps should reduce at least 1 ton per day.

Capt. STEPHENS testified to the value of the property, and had no hesitation in saying that properly conducted and under proper management it would pay good dividends to the shareholders. It could be made at least equally productive at the adjoining Mine, St. Dennis Consols; indeed the whole hill was full of tin. By exploration he had no doubt many more important discoveries would be made. For instance, below the engine-house there was another valuable lode, which had never been laid open. It was a very great pity there was not a little more capital subscribed, so as to work the mine with the energy it deserves.

It was mentioned that about 250*l.* would be sufficient to complete the tramroad.

A vote of thanks to the Chairman closed the proceedings.

LADYWELL MINING COMPANY.

A general meeting of shareholders was held at the offices, St. Helen's-place, on Thursday,

Mr. THOMAS CLEMENT MUNDEY in the chair.

Mr. F. R. WILSON (the secretary) read the notice convening the meeting.

The report of Capt. Arthur Waters stated that the opinion expressed in his general report a year ago is unaltered; he still thinks that Ladywell will turn out a very valuable property. The trials and explorations made by the company have shown results equal to their highest expectations, and convince him that they have only to get a little deeper to have lodes of similar character to the Roman vein in the Gravels Mine. They have put a rise from the 16 to adit in a good bunch of ore, and when ready to make returns will find the ground in stoping order. He remembers when neither Tankerville nor Roman Gravels showed so much lead in sight as Ladywell do to-day; and it is on account of this fact, with the belief that the mine will become as great as either, that he continues to be one of the largest shareholders in the company.

The CHAIRMAN said it was satisfactory to know that Capt. Waters, who was present to reply to any questions, was of opinion that he would within six months from the present time be able to commence sampling 50 tons of ore per month. Dressing machinery was about to be put up, which was at least a satisfactory indication, leading to the conclusion that the manager had now seen sufficient of the mine to justify him in incurring that expenditure, and at the same time points to an early success. He need not dwell upon the prospects presented at the several points of operation, as they were so fully explained by the manager in his report, but he could not help directing attention to the important statement with which that report concluded—namely, that he remembers when neither Tankerville nor Roman Gravels showed so much lead in sight as Ladywell do so to-day, and it is on account of this fact, with the belief that the mine will become as great as either, that he continues to be one of the largest shareholders in the company. He (the Chairman) did not know that anyone could give a more substantial evidence of the sincerity of his opinion than that adduced by Capt. Waters, and certainly as the mine was developed every indication seemed to strengthen the favourable opinion expressed at the inception of the enterprise. He then moved that the report and accounts be received and adopted.——Mr. F. COPE seconded the proposition, which was put and carried unanimously.

Capt. WATERS pointed out upon the section the various workings in the mine as detailed in his report, and expressed the greatest confidence in the realisation of an early success. He certainly calculated upon being able within the current year to commence sampling 50 tons of lead per month.

Upon the proposition of Mr. H. G. SHARP, seconded by Mr. GEACH, it was unanimously agreed to appoint Mr. Whaley auditor.

Votes of thanks were passed to the Chairman, directors, manager and secretary, which closed the proceedings.

WEST TOLGUS MINING COMPANY.

A two-monthly meeting was held at the mine on Wednesday, Mr. RICHARD TAYLOR presiding. The accounts showed:—To labour costs eight weeks ending March 6, 1691*l.*; merchants' bills, 1260*l.*: total, 2950*l.*—Credits—By copper ores sold Feb. 5, 430 tons, 2055*l.*: loss, 895*l.* A call of 30*s.* per share was made, and it was resolved that the resolution passed at the last meeting respecting the pay and settling should be rescinded, thus re-adopting the four weeks' pay system. The report of the manager and agents—Capts. Hancock, Gribble, and Vigus—is highly encouraging, the ores sold for the next account having realised about sufficient to meet the cost. With present prospects a small profit may be expected at the June account. The agents in the course of their report say that Taylor's shaft is being sunk below the 125 by twelve men and three boys, at 50*l.* per fathom shaft, and they are about 15 ft. below the level. They will have to sink 2 ft. or 3 ft. more before fixing a plunger-lift. The 125 west has been extended 22 fms. from the shaft, and the last 12 fms. have been on the course of the lode, which is now 8 ft. wide, yielding 9 tons of ore per fathom. It is calculated that the 12 fms. being driven through have yielded 120 tons of good ore. The lode in the 85 west is full 7 ft. wide, yielding 10 tons of ore per fathom, and worth 55*l.* per fathom. It is being driven by six men, at 6*l.* 10*s.* per fathom. The lode in the rise in the back of the 85 is nearly 5 ft. wide, yielding 7 tons of ore per fathom, worth 38*l.* per fathom. The prospects of the mine were never more encouraging than they are at present. The drivage in the bottom end, the 120 west, since the last account has opened up about 12 fms. of very rich ore ground, worth 80*l.* per fathom; and the very fine course of ore in the 85 west, which is producing 10 tons of ore per fathom, worth 50*l.* per fathom, add considerably to the value of the mine. The ores sold for our next account have realised 2743*l.* 18*s.* 11*d.* This will about meet the cost of the mine. We expect that we shall have a larger quantity of ores at our next sampling, and if they realise the same prices as those of our last sale we may look forward to a small profit to the May and June account.

GREAT EAST FOXDALE SILVER-LEAD MINING COMPANY.

The half-yearly general meeting of shareholders was held at the office of the company, Seel-street, Liverpool, on Saturday,

Mr. JOHN WALKER in the chair.

Mr. THOMAS HUGHES (the secretary) read the directors' report, as follows:—

The directors, in presenting their report to the shareholders at this half yearly meeting, are glad to state that most favourable progress has been made in developing the mine since the last meeting. The contract then made to sink the shaft 15 fms. deeper has been completed, the new pitwork fixed, and arrangements made to cut a new lodge, and drive to the lode under the 53, as reported at the last meeting. The directors have every confidence that when this piece of work is finished the lode in the 68 will be found richer than in the 53. It will be recollected that at the last general meeting it was decided to suspend the driving on the 53, and likewise the stope in the 40, until the shaft was sunk, and the lode cut in the 68, or new level. The directors fully expected that by this meeting the cross-cut would be completed, as well as the sinking of the shaft: but, as this has not yet been done, they are unable to report as to the productiveness of the lode; however, judging from general appearances, they have every confidence that the lode when cut will be found rich for lead. As arranged at last meeting, the directors ordered the driving of the 40 fm. level to be pushed on with all speed, and there has been a distance of 39 fms. driven within the past six months, passing through a good lode, in many places very rich for lead, and in the forebreast there is at present a rib of blende, nearly 5 in. wide, and the lode looks very encouraging. The directors are of opinion that it will yet require a month or so of driving to complete the cross-cut from the shaft to the 68; by that time they will arrange to have dressing-floors ready to commence dressing the ore now on surface, and which is estimated to be worth 800*l.*, and they have every confidence that when the lode at the 68 is opened up in conjunction with the driving on the 53, and the opening up of the reserves of ore between the 68 and 40 fm. levels, the mine will then be making profits. In calling attention to the balance-sheet, a copy of which has been sent to each shareholder, showing a balance to the credit of the company of 938*l.*, together with machinery and plant valued at 1632*l.* 17*s.*, after deducting 10 per cent. per annum for depreciation, the directors beg to mention that the ore on surface valued at 800*l.*, and also the reserves of ore already discovered, are not taken into account in the balance-sheet. They trust that this statement will be satisfactory to the shareholders, and will show the great care and economy that have been observed in bringing this promising mine to its present position; and, at the same time, leaving so good a balance to the credit of the company. The directors did not consider it necessary this time to call in an extra captain to report, as the new ore ground has not yet been reached; but they have had the previous plans carefully extended, in order to show the distance of ground that has been laid open and the work done during the past six months. In conclusion, the directors desire to state that they have every confidence in the future of the mine, and hope to be able by the next half-yearly meeting to report large and profitable sales of ore.

The captain's report was then read, as follows:—

Marrown, April 21.—The engine-shaft has been sunk 15 fms. below the 53, and has been divided and cased, the main rods have been lengthened, and a cistern placed, with plunger-lift, and good ladder-road, all complete, down to the bottom, or 68. The shaftmen have begun to cut out the 68 lodge, to cross-cut into the lode, which at this point I am looking forward to with interest. The 53 has been driven 8 fms. 1 ft. 6 in., out of which some good ore has been raised, as seen on surface. This level should by all means be driven ahead to open out the ore ground seen going down in the sole of the 40. A distance of 2 fms. 3 ft. has also been driven west; but as the lode in this direction appears to have been worked out for some distance by the old miners, it was not advisable to continue this drivage any further west. The 40 south-east level has been driven 27 fms. 2 ft., and has intersected a cross vein, on which we have opened out 1 fm. 1 ft. north, and 1 fm. 2 ft. south. This cross vein has not a very kindly appearance in itself; nevertheless, it has greatly improved the general character of the main east and west lode, which is looking very promising indeed, with a rib of blende on the hanging-wall about 6 in. in thickness. In the stope in this level 4 fms. 3 ft. of ore ground has been stoped away. All our machinery above and below is in fair working order.

The CHAIRMAN said that the reports which had just been read showed that considerable progress has been made during the past half-year, and he was glad to express the confidence he felt in the early success of the mine. He was sure that the energy with which the directors had conducted the affairs of the company would receive the approval of the meeting, and he had great pleasure in referring to the efficient manner in which the working of the mine had been looked after by their managing director, Mr. T. Hughes. He would now beg to move that the reports and accounts be received and adopted.

Mr. WHARRIE asked for an explanation relative to the additional outlay in machinery account and some items of expenditure in the balance-sheet; and, after a full and satisfactory explanation by the secretary, the proposition as moved by the CHAIRMAN that the report and balance-sheet be received and adopted, was seconded by Mr. ORMANDY, and carried unanimously.

Mr. BERTENSHAW wished to call attention to the necessity of at once erecting dressing floors, as he could not understand why so much ore as he had seen on surface should be kept unsold for want of dressing.——Mr. GRAVES also considered that dressing-floors should be erected without delay.

The MANAGING DIRECTOR stated, in reply, that the directors as well as himself were fully as anxious as the shareholders could be to send ore to market. He trusted that the gentlemen present would not forget that the directors had nearly half the shares of the company, which was he thought a sufficient guarantee that they would do their utmost to benefit the concern. The matter of dressing-floors was but a secondary consideration: the great point was to open up the ore ground. He begged to say that not a moment should be lost in erecting suitable dressing-floors when the proper time arrives. For his part, he should like to see ten times the quantity of leadstuff on surface. He wished to remind the shareholders that it was arranged at the last meeting not to put up any dressing-floors until the lode had been cut in the 65 fm. level. He had hoped to be able to report on that lode for this meeting; but the men had yet to drive to it, and it would take a month or so to reach. They would perceive from the plans now before them that the lode dips about 6 fms. from the shaft, as seen in the cross at the 53 fm. level. He had every confidence that when the lode was cut in the new level it would prove to be richer than it was in the 40 and 53 fm. levels.

Sundry discussions then followed relative to the development of the property, future prospects, &c., after which Mr. ORMANDY proposed a vote of thanks to the directors, which was seconded by Mr. LESLIE, and carried unanimously.

A vote of thanks to the Chairman terminated the proceedings.

NORTH TRESKERBY MINING COMPANY.

A general meeting of shareholders was held at the mine on Wednesday, the purser, Mr. H. L. PHILLIPS, F.G.S., in the chair. The accounts showed a debit balance of 228*l.* The manager, Captain Richard Pryor, stated that the deep adit level cross-cut had been driven 58 fathoms to cut the north lodes, the northermost lode of which was very large, and had produced very large quantities of tin at shallow levels. When cut there would be a back of 75 fathoms deep on the course of the lode. As soon as the water was drained from the shallow workings they intended to resume them, and hoped to return pretty much tin. There were other lodes which would be intersected earlier than this one, but the lode referred to seemed to be the principal one in the locality.——The CHAIRMAN said it would be necessary to make a call of 8*s.* per share, which was unanimously agreed to. It was also resolved to take legal proceedings against all shareholders in arrears of calls.——The PURSER said he held a very heavy interest himself; but they had an extensive, and he believed, a very valuable property, and as soon as the prices of metals improved it would be a matter for consideration how the property could be best developed.

SOUTH FRANCES MINING COMPANY.

The meeting at South Frances, on Monday, was presided over by Mr. J. F. PENROSE, the purser. The accounts showed a loss on the 12 weeks' working of 1569*l.* 4*s.* 6*d.*, and the actual balance now against the mine is 1644*l.*

Mr. LAWS asked whether there was likely to be any increase or decrease in the future costs?——Capt. JAMES replied that he could not at present promise that there would be any material decrease in the costs, because as he had mentioned in the report nearly half their men were employed in driving cross-cuts, and doing other dead work to cut the new lode; that they were, of course, bound to do. He hoped, however, that by-and-bye they might be able to ease the merchants' bills a little. Coals, for instance, were getting cheaper, and the coal bills would not be so heavy in the next quarter as they were in the past, but with regard to the labour costs he could not see that there would be any material reduction unless they stopped some of their present bargains, which would not be a wise thing to do.

The agents' report said—"We are very pleased to say that the prospects of the mine are of a most cheering character, independently of the great objects of the mine—the intersection of the West Basset great tin lode in depth. The new tin lode as seen in the 104 stope and at the 124 cross-cut, is quite enough to inspire the mind with vigorous hope, and justify your agents in stating that at no time since they have been connected with the mine have the prospects borne any comparison with the present. Fully believing that we have seen the lowest price for tin, and that the day is not far distant when we shall be able to increase our returns, we have the fullest confidence in the ultimate result, and that the persevering adventurers will find in the development of this mine a prize of no ordinary character."

The report and accounts having been adopted, the CHAIRMAN remarked that the balance against the mine was certainly a heavy one, but his own feeling was that they should not make a larger call than was made on the last occasion—3*l.* With their improving prospects he thought they might fairly discount the difference between the 3*l.* call and the actual debit balance—a matter of about 150*l.* only. He further mentioned that the third instalment to West Frances would not become payable until the next meeting, and with such a cheering outlook he thought they would be in a better position to pay the money when the time came without the necessity of an increased call.——Mr. LAWS expressed himself in similar terms, and moved that a call of 3*l.* per share be made.——This was seconded by Mr. PAULL, and carried.

The CHAIRMAN next stated that the agents and himself had voluntarily agreed to a reduction of their salaries during existing circumstances, and Mr. WOOLCOCK and one or two other shareholders said it was a matter deserving of special notice that their purser and agents had taken this step without solicitation from anybody.

The future of the mine was then spoken of in very cheering terms, the CHAIRMAN expressing as his opinion that they had reached the turning point in the mine, and that at each succeeding account they would continue to meet under increasingly favourable circumstances.——Capt. JAMES, the managing agent, was not less sanguine. If they could go on opening up ground of the same value as they had in the 104 stope and 124 cross-cut, and raise the ore in sufficient quantities, they could pay their costs even at the present price that was paid for tin. In addition to this they had the West Basset great tin lode in depth. That was the point at which they were now aiming, and they were making every exertion to get down Pascoe's shaft as quickly as possible in order to develope the lode. He did not know of a mine in the county holding out greater chances of success than South Wheal Frances, and he believed they should open up a mine there that would well repay the adventurers for their past trouble and outlay.

NORTH CROFTY MINING COMPANY.

The special meeting of shareholders, held on Tuesday, and called for the purpose of making a call, if necessary, and other business, contrary to general expectation was a peaceable gathering, lasting but a short time. Mr. W. WATSON, the purser, who presided, stated that up to the meeting in March last 2645 shares had been relinquished, and he now had to report a further relinquishment of 395 shares. The total shares of 5160, into which the mine had been divided, were now reduced by relinquishments to 2250. The balance against the shareholders was 2516*l.* 17*s.* 1*d.* They owed to merchants in round numbers about 3100*l.* The arrears of calls to the present time amounted to 733*l.* The purser said the only alternative left to the adventurers was to wind-up the mine, and, therefore, they must not make a call.—A long discussion ensued as to the acceptance of the 395 relinquished shares reported at the meeting.——Mr. BARTLE objected to their being accepted, and said if the existing shareholders at the present time were to be liable, any more than those who had relinquished, he should relinquish at once.——The PURSER observed that the person relinquishing was only liable for his proportion of his liabilities up to the end of the working month after the relinquishment, and then he took his proportion of the assets of the company.——After some further conversation it was agreed unanimously, on the motion of Mr. BARTLE and Mr. CHARLES TYACK, not to receive the relinquishments, and not to enter them in the cost-book.

Mr. T. PRYOR then asked if there was any chance of carrying on the mine with the present number of shares if a call was made, remembering that the prospects were much better than they had been?——The PURSER thought not. The representatives of the late Mr. Dilks, holding 450 shares, had said they would pay no more calls; and Mr. MARTIN, another large shareholder, protested against a call.——In answer to a question, the PURSER said they were in a position to abandon the mine.——Mr. BARTLE then proposed, and Mr. J. VIVIAN, jun., seconded the following resolution:—"That the operations of the mine be forthwith abandoned, and that the mine, with the leases, be offered for sale as a going concern, and if not sold that the pitwork be drawn to the surface, and, together with the machinery and materials be sold, by public auction."——This was carried unanimously.

The PURSER then said he should be glad to act as liquidator of the concern, a position in which many of the chief creditors desired to see him, and also many of those who had relinquished shares, and others who were still holding. He hoped those present would concur in that wish, if not he would willingly retire. The concern had taken up a good deal of his time as they might suppose, and he hoped it would for some time to come.——Mr. T. PRYOR objected to the word liquidator, which was not known in that part of the country, although it might be in London.——The PURSER considered it a capital word, and said it was used in the Stannaries Court now.——Mr. PRYOR observed that it would give more satisfaction to the shareholders if a committee of one or two shareholders were appointed with the purser to wind-up the affairs and realise the assets. It would be better to do this than leave it to one gentleman who had relinquished every share in the concern.——The PURSER stated that he was quite willing to act with such a committee, and Messrs. T. Pryor, W. B. Paynter, and F. Bartle were elected to act in conjunction with the purser in realising the assets, paying off the liabilities, and winding-up the affairs of the company as soon as possible.——A special meeting will be held on May 12 to confirm the resolutions passed.

SCOTTISH AUSTRALIAN MINING COMPANY.

The half-yearly general meeting of shareholders will be held at the London Tavern, on Friday, when the directors will submit their report and accounts, embracing the operations of the company in Australia and London, for the six months ending Dec. 31:—

LAMBTON COLLIERY.—This company's sales of coal amounted to 84,449 tons for the six months ending Dec. 31 last, as against 86,133 tons sold during the corresponding six months of 1872. The net profit realised from the colliery during the six months ending Dec. 31 last amounts to 13,181*l.* 3*s.* 7*d.*, as shown by the annexed colliery profit and loss account, the necessary disbursements for maintenance and renewal having been made and charged to that account. During about two months of the half-year under review an exceptionally large number of vessels arrived at Newcastle to load with Australian coal—a much larger number, in fact, than could be loaded by the then existing cranes and staiths, until after, in some cases, very considerable delay, and more than the harbour could properly accommodate; but this state of things, although attended by inconveniences at the time, will have been beneficial to the future coal trade of the port, inasmuch as it has led the Government to provide increased shipping appliances and facilities, and the local municipal authorities to improve and extend the harbour, so as to let ships, when loaded, get more quickly away from the cranes to moorings in a suitable depth of water. Until July 14 last the price of large coal, put free on board ships at Newcastle, was 12*s.*, and that of small coal 6*s.* per ton. From that date the price of large coal charged by the collieries has been 14*s.* per ton, and this price has been received for the coal since sold by this company in the half-year now reported on; but the sales stated in the annexed colliery profit and loss account include a considerable quantity of coal delivered under contracts entered into when the price was very much lower. All the company's contracts at low prices expired in September last. The men employed in the Australian collieries are receiving a high rate of wages, and working a short number of hours per day. They have received for every rise that has taken place in the market price of coal a corresponding proportionate increase in their wages; but nothing in the form of a strike or attention from work has occurred since the beginning of February of last year. The price of large coal at the commencement of the half-year now current was 14*s.* per ton, and up to this date the directors had received no advice of any alteration in that respect

having been made; and, as all the company's contracts at low prices have, as above stated, expired, if the demand for Australian coal shall continue to be well maintained, a favourable result of their trade for the six months ending with June next may reasonably be expected. Mr. Morehead, however, in expressing to the board his views on the state of the coal trade of the colony observes, "The relations between employer and employed in the colliery business are not satisfactory," and he considers, and the board concur with him in thinking, that while Lambton Colliery will continue to return good profits to the company, it would not be prudent to indulge in too sanguine anticipations as regards the early future of the coal trade, both on account of the condition of the labour market and the influence which the present declining tendency in the price of coal in this country may be expected to exercise upon that in the colony. The railway, rolling-stock, machinery, and other material connected with the colliery operations are reported by Mr. Croudace, the viewer, to be all in good order, the railway, for three-fourths of its length, having been re-laid with new sleepers, and the remainder being about to be similarly dealt with.

THE GOOD HOPE PROPERTY.—There is nothing as yet of importance to report as the result of what has been done at this property by the miners who have taken it on lease to work it on a royalty, and who are continuing their operations.

THE CADIA PROPERTIES.—The miners who entered into a temporary arrangement to explore and work these properties for gold, receiving as their remuneration a proportion of the produce, have made fair progress. They have raised altogether 161½ ozs. of gold; and they are now sinking on the reef, with a view to ascertain whether it may not prove more productive in depth than near the surface, to which as yet their operations have been confined. The following is an extract from Mr. Morehead's last letter bearing on the matter:—"I send extracts from the most recent letters that I have received from Mr. Trathen (the captain of the miners at Cadia). These seem to me decidedly satisfactory, and to confirm the belief that this property is a fine subject to be worked both for gold and copper on a large scale, with machinery driven by water-power. I am much disposed to recommend some action with a view to turning Cadia to account as a profit earner to the company, and shall probably address the board on the subject by the next mail." Mr. Morehead has found it desirable to acquire from the Government, at the rate of 1*l.* per acre, 1324 acres of land adjoining the Cadia properties, his main object being to secure as large an extent as possible of the gold-bearing reef, and also to get command of extended water-power. The Cadia properties now, therefore, consist of 2903A. 0R. 22P. of freehold, and 150 acres of leasehold land.

ACCOUNTS—DIVIDEND.—The annexed accounts fully set forth the operations of the company during the six months ending Dec. 31, 1873, and exhibit its position at that date:—

The balance of profit shown by the general revenue account is	£12,878	2	6
The directors propose to pay a dividend at the rate of 15 per cent. per annum on the paid up capital of the company (127,500*l.*), free of income tax, which will require	£ 9,562	10	0
To add to colliery reserve fund (which will thereby be raised to 5000*l.*) the sum of	2,000	0	0
And to carry forward to next account	1,315	12	6
Total	£12,878	2	6

[For remainder of Meetings see to-day's Journal.]

FOREIGN MINING AND METALLURGY.

Industrial activity can scarcely be said to have returned in France; the forges are generally working pretty well, but large orders, well calculated to assure the future, still make default. There are no established or well-defined quotations at present either for pig or iron, and the figures given can accordingly be only accepted as approximations. At St. Dizier some transactions are stated to have been concluded in refining pig at the rate of 5*l.* per ton, and in coke-made iron at the rate of 8*l.* 16s. to 9*l.* 4s. per ton. In the Meurthe-et-Moselle business is still very stagnant, and pig has been selling there at prices ranging from 2*l.* 17s. 6d. to 3*l.* per ton. The propriety of blowing out some of the blast furnaces until present stocks are disposed of has been seriously discussed. The Creusot Works, which tendered recently for the supply of 10,500 tons of rails for lines in Alsace and Lorraine, sent in the lowest tender and obtained the contract, beating one English competitor and four German establishments, the latter comprising the houses of Krupp and Bochum.

Transactions in copper at Paris have exhibited a lack of animation. Nevertheless, copper has pretty well sustained former rates. Chilian in bars has brought 80*l.*; ditto ordinary descriptions, 78*l.*; ditto ingots, 85*l.*; English tough cake, 85*l.*; and Corocoro minerals, 80*l.* per ton. At Marseilles business in copper has presented no great activity. The aspect of the German copper markets also continues little favourable. Tin has regained favour at Paris, and has been tending upwards. Banca, delivered at Havre or Paris, has made 102*l.*; Straits, ditto, 98*l.*; and English, delivered at Havre or Rouen, 98*l.* per ton. Tin has been a little better supported at Marseilles Banca tin has experienced many fluctuations at Rotterdam; the latest quotations were 56 fl.; and for deliveries between May and July, 55 fl. Billiton, after having been carried to 58 fl., has fallen to 55 fl. In Germany the tin markets have been tolerably firm. Lead has been rather weaker in price at Paris; French, Spanish, and English have brought 20*l.* 16s., and Belgian and German 21*l.* 8s. per ton. At Amsterdam lead has exhibited a downward tendency. Lead has not regained favour upon the Paris market; Silesian has realised 22*l.* 4s. per ton with some difficulty; other good marks have brought 22*l.* per ton delivered at Havre, and 22*l.* 8s. per ton delivered at Paris. The German zinc markets have been rather dull.

The condition of the Belgian iron trade presents little change. A few transactions have taken place on English account, but they have been of less importance than might have been supposed from the noise made about them. There has been a margin in quotations in favour of Belgium, as compared with England, but it is not the dearness of prices so much as the want of purchasers which paralyses transactions. No one has shown much eagerness to buy Belgian iron in England, and it has been the same in Belgium itself. Operations on hand are being carried through, but industry exhibits little animation. The rolling-mills and workshops which are still in operation are going on from day to day without being assured of the morrow. Prices remain without change; pig stands at a very low figure in consequence of the heavy stocks existing in the Luxembourg. The industrial bourse established at Liége has commenced operations, and it has thus far been fairly attended, while some rather important transactions have been concluded. A similar bourse is expected to be shortly opened at Brussels. These institutions, if well organised and carefully conducted, may render important services to Belgian metallurgical industry. The house of Gonner-Munier, Helson, and Co., of Rumelange, is to become a company, with M. Munier as managing director.

An adjudication for coal required for the Belgian State Railways has just taken place at Charleroi, St. Ghislain, La Louvière, and Liége. The prices at which the supply of the lots of coal required were offered presented a serious fall as compared with the corresponding prices of Feb. 18, with regard to the question whether the fall in prices is making any further progress, it may be answered both affirmatively and negatively; affirmatively in this sense, that low prices are becoming general, and that concessions in regard to prices are made more openly; negatively, that if some few transactions are concluded upon lower terms they must be regarded as exceptions to the general rule. In the Liége basin the state of the coal trade has rather changed for the worse, if anything; washed coke is quoted in the Liége basin at 1*l.* 3s. 4d. per ton. The price of labour has not fallen. The extraction of coal has been much reduced in the Liége basin, as coalowners are anxious not to increase their stocks. The balance of profit realised in 1873 by the Gosson-Lagasse Colliery Company was very considerable, amounting as it did to 116,729*l.* The amount divided among the shareholders for the year was 22*l.* per share, or 105,600*l.* The reserve fund has been increased to 16,753*l.* The rough profit acquired last year by the Belgian Collieries Company was 121,358*l.*

From Russia we learn that the falling off in the import of foreign coal at Riga has been remarkable. In 1871 the quantity of coal imported amounted to 3,000,000 poods, in 1872 it decreased to 2,350,000 poods, and in 1873 it scarcely reached 181,216 poods. The greatest part of the foreign coal imported at Riga has been hitherto sent to gas factories at Moscow. But now, owing to the uncertainties of foreign supply and the high prices, the Moscow Gas Company have determined, as far as practicable, to use native coal only. With this view they have concluded a contract with the Muraven Coal Company for the supply of Russian coal. In order, however, to encourage the import of foreign coal, the Riga Railway Company have considerably reduced their tariff for the transit of that article. Whether this step will revive the foreign coal trade time will show.

There is little fresh to report with respect to the French coal trade. The activity prevailing in business has neither increased nor diminished, and prices remain very much as they were. No further reduction in quotations is anticipated. The Administration of Public Assistance will shortly invite tenders for the coal required for the hospitals of Paris for a year, from July 1, 1874.

The production of coal in the Ruhr basin last year was 16,219,914 tons, obtained with an average of 74,580 miners at work. In 1872 the corresponding production was 14,429,644 tons, obtained with an average of 64,886 miners working. The increase in the production last year was thus 1,790,270 tons, or nearly 14 per cent. In 1850 the production of the Ruhr basin was 1,662,581 tons; in 1860, 4,276,254 tons; and in 1870, 12,219,931 tons.

THE CAPE BRETON MARBLE MOUNTAIN.

The constantly increasing application of the finer varieties of marble for the purpose of ordinary ornamentation has for some time past created so large a demand for the material that those engaged in marble quarrying have found it a highly remunerative occupation, especially when, as in the case of the Marble Mountain of Cape Breton, the stone is of considerable beauty and readily obtainable. The discovery of these marbles was made less than six years since by Mr. N. J. Brown, of Port Hood, yet in the hands of his firm, and of the CAPE BRETON MARBLE COMPANY, to whom the property has recently been transferred, the quarries have received a fair amount of development, and the high character of the marble has been well established in the market. The quarries have been several times visited and inspected by Prof. Henry How, D.C.L., of the University of King's College, Windsor, Nova Scotia, and his reports contain much valuable and interesting information. The property comprises an area of about 6000 acres, extending for 9¼ miles along the north side of the West Bay of Bras d'Or lake, and about 1½ mile back from the water; about 3000 acres is proved to consist of marble, which forms the entire core of the mountain, and averages 700 ft. in height. As the mountain is very steep, operations are carried on with the utmost facility and economy, and as a railway has been constructed to connect the quarries with the wharf at which the marble is shipped, the enterprise promises to become of great industrial importance.

The marble is classified into thirteen varieties, differing in shade of colour and quality; the most esteemed is, of course, the pure white, which is much valued for monumental purposes. The white and several other varieties have been carefully examined by Prof. How, who reports that in those which are not pure white the colours are grey, nearly black, blue, and pale red, intermixed with white in clouds, bands, and streaks; in one variety the prevailing tint is pink, and variegation is produced by a little blue; in another these colours are about reversed, and white streaks are added. The result of the mixing of the tints is the production of varieties very pleasing to the eye. As regards quality the samples examined were excellent, considering they were for the most part obtained during the earlier operations, the quality invariably improving in depth. A well-known firm of marble workers at Pictou—Messrs. G. W. Ross and Co.—certify that they are much pleased with its texture and quality, and state that it works as freely as the best Italian marble, and will, they believe, be more durable for outside work; it takes as good a polish as any marble they ever used. Another marble worker—Mr. G. A. Sanford, of Halifax—declares that it resembles the New York building marble in texture, but some of the small specimens are equal to the finest statuary. The blocks tested varied in weight from 4 cwts. to 1 ton. The best rock is contained within 200 or 300 acres. The beds, according to Prof. How, run in a nearly east and west course, and are nearly vertical, with a dip of 80° to the south. The Grand Quarry is situated about 450 ft. above the level of the lake, and the workings open, which are of considerable extent, show nothing but marble throughout. As it was soon evident that the quality of the marble improved rapidly in depth, a tunnel was formed on the slope of the mountain to strike the solid rock, and it is opposite the mouth of this tunnel that the lower part of the 60 ft. face is exposed. Operations were greatly facilitated by the occurrence of a bed of soft yellow earth about 8 ft. thick against the face of the marble. This being removed the rock will be readily quarried out and carried through the tunnel, which is 120 ft. long, and runs through solid self-supporting blue and white marble, on a railway, and deposited in the yard at the mouth of the tunnel, which is about 200 yards only from the edge of the lake. At the upper part the rock is very much broken, but the cracks diminish in number and extent in depth, and for some distance about the mouth of the tunnel the rock is white, solid, and quite free of flaws; and as the beds here are from 4 to 5 ft. thick from north to south, it is clear that immense blocks can be removed. It is not proposed to work this portion at present, as it is thought better to wait for the arrival of a skilled workman than to sacrifice such valuable rock by the imperfect operations now alone practicable. The marble actually being removed is from the east of the tunnel, and at a rather higher level; it is taken out by plug and feather, and some 200 tons have lately been quarried. Three blocks are each about 9 ft. long, and average about 2 ft. square, and weigh considerably more than a ton. Several others are of smaller but still considerable dimensions.

Hitherto comparatively little attention has been given to any variety but the white, although the coloured varieties are found in considerable bands, and may, doubtless, be utilised if necessary. The fine white statuary marble is obtained from the East or Statuary Quarry; and in the Grand Quarry they obtain a fine white building marble, a coarser white "ice marble," a blue and white clouded or Brockadilla marble, some half-dozen other varieties of Brockadilla, in connection with green and white, green, blue, and white, and red streaked with blue and white. At the east end of the same quarry there is a fine flesh-coloured marble, and east of the Statuary Quarry, where it changes to darker marbles, there are some very fine varieties, some showing blue and blue mixed with red, and some having rather deep red stains mixed with green and striped with nearly black lines. The lime, which has been analysed by Prof. How, and found to contain 94·31 of carbonate of lime, is found a little above the level of the lake, in a band of 100 ft. thickness, and is becoming so much a favourite that it will, doubtless, contribute largely to the profits of the company.

For the last two years the work of development has been rapidly going on, and the marble at the end of the tunnel, now finished, is of good quality. Along the whole surface exposed to view there is abundant evidence that marble in immense quantities is easily available. In short, the developments now made justify the present lessees in expressing their firm conviction that the variety and extent of the limestone and marble rocks, cropping out in such profusion in every direction on the estate, are of such a nature that a judicious investment of capital on a scale commensurate with its importance, would render it a mine of wealth to its fortunate possessors. It is believed that the variety of shade and texture, and the great extent of the formation, will prove on further developments to equal the quarries at Carrara and Massa, in Italy, while the facilities for quarrying and shipment and the manufacture of lime are obvious.

SAFETY-LAMPS.—Mr. J. B. STONE, of Birmingham, has patented an invention which consists in improving the illuminating power of the said lamps by making the glass surrounding the flame of a cylindrical figure within and a convex figure without, or convex both within and without. By this means the light is so concentrated that when the lamp is hung vertically the illumination is for the most part directed horizontally at or about the level of the lamp. When the light is required to be directed upwards or downwards the glass is made of a conical figure.

NEW LUBRICANT.—Mr. O. TROSSIN, of Berlin, has patented a new grease to enable superheated steam to be used as a motive-power in steam engines, and the mode of applying grease. This invention consists in using metals or alloys fusible at a low temperature as a lubricant for steam engines working with superheated steam, and in arrangements of the engine and boiler for enabling such lubricant to be used. The boiler is provided with a superheating coil, from which the steam passes to the slide jacket of the engine cylinder, and with slides by which the flame from the furnace may be made to pass either directly to the boiler, or first through the chamber containing the superheating coil, and thence to the boiler. The engine cylinder is enclosed by a jacket communicating with the exhaust port, and by means of a pipe with an internal flue of the boiler. The piston and slide rods are provided with cups for containing the lubricant, and a cup is provided within the jacket for supplying the lubricant to the piston. The lubricant is also supplied to the slide from a cup communicating with passages formed in the facing of the ports and in the slide. Before starting the engine the superheated steam is admitted from the boiler to the slide jacket, whence it passes through a pipe with a cock into the cylinder jacket, whereby the several parts of the engine are heated to the requisite degree to melt the metal or alloy acting as lubricant.

LONDON GENERAL OMNIBUS COMPANY.—Traffic receipts for the week ending April 26, 11,352*l.* 5s. 1d.

Lectures at the Royal School of Mines.

ON THE PHENOMENA OF LIFE AS MOTION AND CONSCIOUSNESS.

Prof. HUXLEY delivered his fourth lecture on the subject of "The Co-ordination of the Modes of Motion of Living Bodies with those of the Surrounding World." He said—We come to-night to consider the nature of the impression made upon the "afferent" nerve in the phenomenon of reflex action, as the result of which it undergoes molecular change, and starts some kind of change in the grey matter of the central organ. Speaking broadly, we may say that all the stimuli acting on these nerves in this manner are modes of motion of bodies outside the organism, or at any rate outside with relation to the extremities of the afferent nerves which they affect. Take the case of the skin; we saw that the nerves of the skin might be stimulated by various methods—by pressure, which is the impact of some external body, by the application of a substance capable of causing chemical change, which is in a manner of motion, or by the application of heat, which again is a mode of motion. These various agencies, applied to the skin by a certain degree of intensity, give rise to the combined mechanical motions called reflex actions, which you will remember are wholly independent of consciousness. The first thing important to notice is that the extremities of the nerves in which the molecular change is set up are not bare upon the surface of the skin; the stimulant does not act directly upon them, but indirectly, through the medium of certain other structures, which constitute an intermediate apparatus. We find in a section of the skin that it consists of two layers; a deeper layer—the true skin or dermis, which contains blood vessels, and is made up more or less of fibrous tissue; and then lying on the dermis a layer—the scarf skin or epidermis—which contains no blood vessels or fibrous tissue, but is made up of cells, rounded in the lower layers of the cells, but become flattened and scaly as they approach the surface. The nerves which go the skin branch out, the bundles break up into isolated nerve fibres, and then these fibres divide and sub-divide until at length they are reduced to nothing more than a thin delicate filament—the axis fibre. It is exceedingly difficult to follow these out, and we cannot speak very definitely about their termination, but they can certainly be traced as far as the most superficial layer of the dermis, and it is probable that they go for a certain distance between the cells of the epidermis, and it is highly probable that they terminate among some of those cells. It is certain that the actual extremities are separated from the surface of the body by one or more layers of cells, so that any impression upon the surface of the body is made through the medium of the cells. This is a very simple apparatus, but in some animals (certain of the salamanders, newts, &c.) certain parts of the skin have a greater delicacy, and are affected by more delicate stimuli, and there we find a modification of the apparatus. Some of the larger cells form a kind of sheath, enclosing smaller cells, which are elongated into long slender filaments, the extremities of which partly protrude from the sheath; and the nerves come up and terminate upon these cells, and probably pass completely into the elongated cells. So far, then, as the skin is concerned, we may notice two things in connection with its reflex action—first, that the stimuli are very few; secondly, that they must either be in actual contact with the living body, or very near to it.

Take the case of the tongue; the general structure of its covering membrane is like that of the skin, and so we find it reacts in the same manner, but it is more delicate, reacting with agents which do not affect the skin. If a little aloes be put on the tongue, especially its back portion, it will give rise to reflex action of a kind different from that of the skin; it will cause a peculiar contortion of the muscles of the face. There is something, then, in the solution which affects the nerve not by contact, by chemical action, or by heat, and we should expect to find some modification of the nerve endings to render them sensitive to this new stimulus. The back part of the tongue has on it a number of large papillæ, known as "circumvallate papillæ," as they are surrounded by a kind of circular ridge. They consist of a substance which answers to the dermis, and are coated by a layer, which answers to the epidermis. But round the sides of this great papillæ are disposed a number of cells, arranged in just the same way as those we saw upon the backs of some of the newts and salamanders; there are sheathing cells, enclosing elongated cells prolonged into a fine filament. A great number of bodies are capable of affecting the nerves distributed to these cells through the medium of the cells, but they must be in contact with them.

Suppose some water, containing sulphuretted hydrogen gas, were rubbed upon the skin or the tongue, no reflex action would ensue: but if a little of the gas be taken into the nostrils, reflex action of the muscles of the face will ensue, and especially if the person be of delicate organisation, and it may cause nausea and vomiting; and here that which gives off the odoriferous body need not be in actual contact; the body itself must be, and as it is gaseous may be, transmitted from a great distance by the process of diffusion. This is the character of all impressions made upon the nasal apparatus, and by means of them the relations of the body to the external world are wonderfully widened. The chamber of the nose is connected with a passage into the throat, and when the mouth is shut the air taken in in breathing passes through the nose, and this air carries with it into the nose the vapours and odours which it contains. These latter may affect the nerve spread upon the walls of the nasal chambers, and upon the medial partition, and thus give rise to reflex action. But the extremities of the olfactory nerve are no more bare and exposed than those of any other afferent nerve; they are distributed to the membrane lining the chambers, and this membrane is covered over again by a cellular layer, but in this layer the cells have almost all become modified in the same way as those we found on the back of the tongue. They are elongated, and there is every reason to believe that the fibres of the olfactory nerve terminate in these long cylindrical, almost fibre-like cells. Here, then, we have a much more delicate apparatus than in the other cases, and we see the apparatus get more and more refined as the agent gets more subtle. The lining membrane of the mouth is obviously essentially a part of the skin turned in, but it is none the less true that the lining of these nasal chambers is nothing more than a part of the skin turned in. In one of the earliest stages of our life the nose in its present state did not exist, but it was represented by a little pouch formed by part of the skin being turned in; it was originally part of the common covering of the body, so that we are dealing with nothing new here; it is still the skin we are considering.

We next come to consider another step—the vibrations of the air, and their connection with the ear, for the present, however, leaving out of consideration the sensation of hearing, and dealing merely with it as a means of reflex action. When a loud sound takes place there is an immediate start of the whole body. In my first lecture I showed you the manner in which this was carried out; how the vibrations fall on the "drum" of the ear are transmitted through the little chain of bones to the *fenestra ovalis*, and thence to the liquid in the chamber, and so to the nerves. The liquid is contained in a bag, called the membranous labyrinth, the bag having three tubes opening into it, to which fibres of the auditory nerve run, and are distributed partly on the side of the bag, and partly to the dilated parts of the canals. It is found on making a section where the nerves enter that they divide and subdivide, and eventually terminate in what answers to the deep layer of the skin—vascular tissue, and that is surmounted by a cellular layer, and there the cells are elongated, and stand out upon the surface; but between these are very delicate cells, which run out in excessively fine filaments, very much more delicate than those of the olfactory nerve. There is every reason to believe that these are connected with the actual terminations of the auditory nerve, and in that way the vibrations of the fluid are conveyed to the nerve. Here, again, there is nothing fresh; there is only a refinement in the delicacy of the apparatus keeping pace with the refinement of the agent. That structure which has been found in the membranous labyrinth is also substantially the most important part of the structure of the cochlea, and I must content myself with saying that because it is one of the most complicated parts of the body; its ultimate and most important elements are

cells, the extremities of which are produced into very fine filaments, while the other ends are in direct relation with the terminations of nerves. This apparatus again is part of the skin, for if we go back to those early days when the nose is but a little pouch or depression, we shall find the ears are merely little pouches or depressions of the skin, which are gradually pushed into the sides of the head, and ultimately become shut off, change their form, and become surrounded with hard bones, and hidden away in the skull. Nevertheless they are actually parts of the integument, parts of the original skin which have been modified, so that to put the organism into relation with those fine aerial vibrations, nature has taken nothing new, adding nothing new, but merely moulded a piece of skin to this more delicate condition.

Lastly, we come to the highest organ of all—that by which the movements of the body are placed in relation not only with all parts of the earth's surface, but with bodies at immense distances from the earth—the sun, planets, &c. I have no doubt that at the sudden sight of a great comet all of you would lift up your hands—that would be a reflex action, excited by the light from the comet. I will speak not of the *sense* of sight, but only of the arrangement so far as to enable some mode of motion outside of us to give rise to some motion inside of us. In the front part of the eye there is the transparent membrane called the cornea, through which you see the coloured iris, in the centre of which is the circular aperture called the pupil. In this aperture there are transparent structures till you come to the back of the eye—a chamber lined internally with a most delicate structure, one of the most delicate in the organism, called the retina. The most essential part of the eye in connection with the apparatus we are considering is this retina; into the back of the eye enters the optic nerve, which spreads out into a great sheet, going right through the retina, and spreading out on the front part of it, but these fibres are exquisitely delicate, and exquisitely transparent in the fresh condition. The retina is composed of several layers—ganglionic corpuscles, &c. Looking to the probabilities of the case, what happens is almost certainly this—the fibre of the nerve seems to be connected with one or other of the ganglionic corpuscles, and that is connected with a fibre which has on it a granular body, and that again is connected with a delicate rod-like transparent structure, sometimes cylindrical, sometimes pointed at the upper end, and altered by almost every agency we can bring to bear on it. These lie upon the outside of the retina perpendicular to its surface, so that what happens is this—the rays of light pass through the transparent fibres of the nerve, through all these layers, and impinge upon these delicate "rods and cones." Light consists of vibrations of the ether of exquisite tenuity, as much finer than the vibrations of the air, as they are, than the contact of a stick with the skin; these vibrations falling upon these delicate structures cause in them some change, which is transmitted to the nerve, and thus to the brain. This looks at first sight to be wonderfully different from a piece of skin; I believe it is so, and yet it is one of the most wonderful facts in morphology that, just as in the case of the nose and ear, so in that of the eye, Nature has not departed one hair's breadth from her original proceeding, but she has taken a piece of skin and turned it about, and made an eye of it. When a vertebrate animal is nothing more than a flat three-layered membrane, the first thing that happens is for two folds of this membrane to grow up and join together, enclosing within them part of the original outer covering or skin; the latter in this part becomes converted into the spinal cord and brain. The upper part of the organism subsequently assumes the form of three dilations, and in the anterior one of these the eyes are produced; they are produced partly by the turning in, in a pouch-like manner, parts of the skin on each side, and partly by the budding out of the portion enclosed in the canal, formed by the junction of the two ridges above mentioned. These two parts connect together in such a way as to show plainly that the structures we have referred to as the "rods and cones" are nothing more than modified cells of the epidermis, just as in the case in the ear, tongue, and skin.

APPLIED GEOLOGY, AND THE LATE PROFESSOR JOHN PHILLIPS.

THE COMPANY OF TURNERS OF LONDON.

In last week's *Mining Journal* we briefly referred to the unfortunate accident to and death of Prof. John Phillips, LL.D., F.R.S., and as it is but a few weeks since that the value of his labours in promoting the industrial application of minerals previously neglected, or comparatively so, were recognised by the Guild of Turners of the City of London in conferring upon him their livery and the freedom of the City, it may not be uninteresting to publish an outline of the proceedings on that occasion, embodying the professor's reply *verbatim*. The Court, which was presided over by the Master—Prof. Tennant—was fully attended by the livery, and a large number of invitations had been accepted—the Baroness Burdett Coutts, Lady Augusta Poulett, Mrs. Brown, Mrs. G. Malcolm, and many other ladies, adding to the brilliancy of the gathering. Alderman Besley, the Chamberlain (Mr. Benj. Scott), Mr. Charlesworth, and Mr. Stanley (the African traveller) were among the visitors.

The congratulatory address was given by Mr. John Jones, an able and energetic member of the company, and was certainly most interesting and appropriate. He said that he would form an imperfect estimate of the duties which the Company of Turners assumed to itself who supposed they limited their concern to the manipulation of the lathe, though that in itself was an important province. The discipline of the eye, the hand, and in some instances the foot, so that all should work simultaneously, yet perform various operations in accurate obedience to the will, yielded a valuable power. The skilled workman was the most perfect mechanical instrument extant. The Court of the Turners' Company took account of all matters that concerned the well-being of the art and mystery or the honour of the craftsmen. That their work, when produced, should bear upon it the impress of beauty, that the widest possible range of substances should become the subjects of their labour, that the largest possible uses should be found for their work, that new markets should be continually ascertained wherein both supply and consumption might be satisfied, in measure and time were constant objects of solicitude on the part of the Turners' Company. In the different departments which belonged to the successful prosecution of their art they looked for men of authority, and by blending them with their fraternity hoped to give emphasis to their desires. A knowledge of the chemical constituents of the substances in which they worked, and their classified characteristics, was, if not a matter of profit, certainly a means of refinement, and a constant source of pleasure. He was happy in being able to address Prof. Phillips under the presidency of the learned professor, their Worshipful Master, to whose discriminating judgment they owed this occasion, and with whose name at the head of their list of distinguished members the Turners' Company regarded themselves *facile princeps* of all the City guilds. He had spoken with reserve as to the profit resulting from mineralogical science, but need not shield himself under hypothesis. He might use the affirmative in view of the unexampled influx of diamonds which has poured into this country from the Cape, all of which must pass under the operation of the lathe before they are fit for ornamental use. It was a pleasure to him, both as a fellow-turner and a friend, to mention that Professor Tennant in his public lectures had predicted the probability of diamonds being found both in Australia and the Cape, long before they were discovered—a prediction founded on a knowledge of the gravels of the countries. Professor Phillips had fulfilled more than one of those particulars which he had described as requirements sought for. He had added to the stock of materials on which our artificers work. Before the multitude of workers were in the Cleveland district excavating iron ore, his geological foresight communicated to the people of England that the chief feature of the country's wealth laid there in great abundance. Again, when John Stuart Mill, whom it is a pleasant memory to me to recall as an acquaintance, pointed out in his place in Parliament that the guarantee of the National Debt was in the coal deposits beneath our soil, and that doubts had arisen as to the continuity of the supply, it was your evidence that largely guided the Royal Commission appointed to enquire into the question. It was Prof. Phillips' evidence, based on his anatomical knowledge of the rocks of England, that largely assisted the Commissioners in their conclusion, reported to Parliament, "that there was no immediate danger." But he should omit what they all felt to be the chief, the crowning, feature of the day's proceedings if he failed to mention his position as professor of geology at the University of Oxford. That day they celebrated the alliance of science with art. When Sir Christopher Wren had committed to him the duty of re-planning London, after the fire, one of his projects was to place the Guildhall in the centre of a square, surrounded by the halls of the different companies, making a demonstration of an University of Arts supplementary and analogous to that University of Science at Oxford of which he was then professor in astronomy. The project was before its time, and failed, but that day they had re-established it. In Prof. Phillips's pleasant volume, entitled "The Valley of the Thames," the ridges of division, and the beds of continuity, are accurately defined, and by the telescope with which he furnishes his readers directed to the past we see the mammoths and hippopotami roaming along the great estuarian plain that stretches from Oxford to the German Ocean. Had it been the Professor's purpose to describe the stream of modern days he would have had to tell of the race of athletes inhabiting the clays of Oxford, between whom and the Dives of the gravels of London there existed so insuperable a bar of separation that not even the inducement of a semi-regal banquet could avail to break it down. His presence there that day was an assurance that on the higher terraces of that riparian settlement are those who are not insensible to the challenges of friendship, and to whom fraternity with the citizens of London is not an unacceptable relationship. His theme had been the alliance of science with art. The present Premier gave us the battle-cry in the phrase "Technical Education," for he is a master of phrases. A member of the late Cabinet, addressing the men of Manchester, said that the combination of science with art was a necessity if they would preserve their trade. Their desire in the coalescence of science with art, at least for the members of the company, is that thereby they may become more worthy visitants of the great museum in which we live, where beauty and utility are so abundant that the life of the most favoured is too short for more than a cursory inspection.

Professor TENNANT said: Professor Phillips, it is with peculiar pleasure that I have the honour to admit you to the Turners' Company of the City of London. In consequence of my regard for your personal character and scientific labours in my own especial studies of mineralogy and geology: it was from reading your works on the Geology of Yorkshire, copying out the sections, and then, in company with Dr. Bowerbank (President of the Paleontographical Society), walking over a part of your fields of labour, that I gained my first helps to the practical knowledge of geology. You have given long service to the British Association for the Advancement of Science, and that association owes you its thanks as one of its original promoters, and its long presiding secretary. The Turners' Company recognise your services for selecting the 127 columns erected in the corridors of the new museum at Oxford. They illustrate beautiful and varied materials distributed through the British Isles, available to the engineer, architect, and others, comprising the great varieties of granite, syenite, porphyry, serpentines, ophicalcite (serpentinous limestone), marbles, &c. Some examples, I believe, are not to be found in any other institution. We have illustrations of new materials of porphyretic granite from Shap Fell recently erected in front of St. Paul's, and now the country is intersected by railways it enables the landed proprietors to offer for sale, and gives to the turner new materials not to be surpassed in any other country for beauty and durability. Your labours in the coal and iron districts have been long known. You gave an account of the existence of rich iron ores in Yorkshire many years before they were worked. These products constitute the main strength of our country, and give employment to thousands of workmen under the mastership of some of our distinguished members, including Sir William Armstrong, Sir John Brown, and Mr. Crawshay. In presenting this badge, which intrinsically is of little value, I beg of you to accept it as a token of our public recognition of your valuable and disinterested labours in the field of science, and the good will the Turners' Company bear to the recent activity shown by the University of Oxford in Technical Education. Mr. Jones has alluded to diamonds. I have here an unusually large specimen from the Cape brought home by one of my former pupils, whom I am pleased to see here. The Turners' Company are now considering the prizes to be offered this year, and will probably offer rewards for cutting and polishing hard stones. The diamond cutters in England 150 years ago were the most celebrated in the world. We have the materials in our colonies, the machinery in our workshops, and I feel convinced the intelligence in our workmen, and I hope this company will be the means of re-establishing this industry in this country.

Prof. PHILLIPS replied: If anything could enhance the distinction which it is now proposed to confer upon me, and which I greatly appreciate, it would be the reception of it from my old friend, the Worshipful Master (Professor Tennant), accompanied by the elegant and instructive remarks of Mr. Jones. By those remarks I learn with great satisfaction that it is by no means the purpose of the Turners' Company to contract its honours to excellence in the manipulation of lathes, but that nothing less is in their view than to take an advanced position in the important question of the union of science and art. I am attached to a great association, which has striven for more than 40 years to break down the real or supposed barriers between science and art. Long may their union last! Mention was made by the Worshipful Master of the interest taken by the Turners' Company in the introduction of a large series of columns made of British marbles, as parts of the structure of the University Museum at Oxford; and it may be desirable to give a short notice of the circumstances which led to this, probably, unique effort to demonstrate the real wealth of the European possessions of Britain in polishable stones. The corridors which surround the large quadrangular court of the Museum were, of necessity, lighted by arches, in the style of the building, and pairs of these arches were to be supported by columns. The design of the architects admitted only of ordinary building stone for shafts, but it occurred to the committee in charge of the edifice that this might be a good opportunity for an addition, both ornamental and useful. One name in particular must be mentioned as of a man specially earnest in this view, a name well-known in connection with many works of cultivated taste and active benevolence—that of Dr. Acland. It was felt to be an occasion for collecting, by gift and purchase, as many as possible of the various granites, syenites, porphyries, serpentines, ophir-calcites, and madreporic and crinoidal marbles, besides other interesting rocks of the oolitic series of strata. In some cases no small difficulty was experienced in carrying out this idea. A column which I particularly desired to have cut from the beautiful syenite of Markfield Knowl is an example. Kindly, and with some difficulty, cut for me by direction of Mr. Ellis, it arrived in Oxford somewhat too large in diameter. In this state, instead of being sent to Aberdeen or London to be polished by steam-power, it was, by some mismanagement, transferred to an excellent establishment for ordinary turning, in Oxford. Mr. Stanley, who is present, knows what a difficult enterprise was the traversing of Eastern Africa; will he pardon me if I say my friend, the turner in Oxford, had a task quite as hard in its way? What, think you, was the courage of the man who, rigging up an apparatus in his ordinary work-room, placed the flinty column between solid centres, and set himself to the labour of, I fear, months, in grinding it down to the right size, and finally polishing it? But the work was done, and it may be long before a second beautiful column will find its way from Charnwood Forest to another institution. On the other hand, great help was found in the natural pleasure which many friends of science and art took in contributing columns from their own county, or, in some cases, their own estates. Thus were favourably met applications to the Duke of Argyll for a shaft of red granite from Mull, and to the Marquis of Breadalbane for a column from the head of Loch Tay. Sometimes it was difficult to get specimens of marble formerly well known in Britain, but now expelled from the builders' thoughts by more costly foreign stones. For some of these spaces are left in the museum colonnades, particularly for the Petworth and other Wealden shell marble, once so highly estimated. The capitals of these shafts deserve some notice: they belong to no conventional type, but have been chosen from characteristic natural families of plants—*e.g.*, filices, cycadaceæ, liliaceæ, coniferæ, &c., and the execution of Irish artists is so good that even botanists of eminent judgment have praised the work. In the warm desire expressed by Mr. Jones to encourage the union of science of art—sisters as they may be regarded, though Dr. Whewell, a man eminent in most branches of knowledge, stated a different affinity when he said, "Art is the mother, the busy and comely mother, of a daughter of far higher and diviner beauty"—I fully share, and wish and hope that the earnest attention now paid to this subject in reference to our great universities may extend the value of their teaching to all professions and all forms of useful art. The basis of education can never be changed—what it was hundreds of years ago it is and must remain. Without language man is not human, without some true method of reasoning, such as mathematics, yield, there can be no advances in knowledge. Keeping to these firm foundations, we may hope so to direct and so to apply them that all who enter upon the work of life (from which, in modern society, few are really exempt or excused) may find their labour dignified, and their social happiness augmented, by the possession of such a basis of knowledge as may admit of continual accessions in the manner most suited to their way of life. The Universities are not at all insensible to the expectations which have been raised for further provision for scientific instruction; witness the Oxford Museum, and the now rising new observatory which is to hold the noble instruments of Dr. De la Rue. There is in the Dublin University an engineering school, and, perhaps, the example may some day be followed in Oxford and Cambridge; but let no one imagine that the lecture room will supplant, or ought to supplant, the workshop. It is there the true processes of art must be learned, and evil would be the day, and false the argument, which should deny the value of hard-won practical skill. What would the most refined student of science be now doing in the study of nature without the thermometer? He might try in vain to make the instrument, but, grateful for its use, he ought surely to be desirous of extending to his fellow-workmen every possible help and encouragement to add scientific education to his manual dexterity. In conclusion, I would express my hope that the principles now adopted by this worshipful company, and so emphatically asserted by the Master and Mr. Jones, may find support in the other great guilds of the first city of the world; and that the connection which has for a long time subsisted between the great London schools and the universities of England may be typified on future occasions by professors of geology and other useful branches of knowledge in which art and science concur for the benefit of the community, expressing what I strongly feel, their gratification on being admitted to so honourable a fellowship.

The proceedings then terminated in the usual manner.

REFINING LEAD.—By the processes usually employed for refining lead a considerable waste occurs, and the separation of the lead from other metals and impurities is rarely perfect. A new system, devised by MM. Payen and Reux, of Marseilles, France, is said to admit of refining lead without the formation of oxides, and has, according to the "Chronique de l'Industrie," the particular advantage of permitting the collection of all foreign metals of which the value may be worth considering. The process is founded on the property which a bath of caustic hydrated melted alkali possesses in dissolving, or at least oxidising, successfully all the metals except three, by drawing them into a soluble scoria in a state of igneous fusion. The three exceptions are lead, silver, and gold. The metals united with the lead are, one after the other, removed by melted soda, the action of the bath being maintained first by a jet of steam, designed to restore constantly the water of the hydrate from which the metals gain oxygen, and urged, according as the metals are in a less degree oxidisable, either by blast of air, or, finally, by carefully measured additions of nitrate of soda. The theory of the reaction is as follows:—By simple solution in water soda abandons all the oxides which it holds in solution or suspension, and is evaporated and dried for use in the operation, almost without loss. The metals oxidise in the melted alkaline bath in the order of their affinity for oxygen, an order modified, however—1, by their particular affinity for soda; 2, by the action of affinity exercised by the largest mass present. Thus tin and the metals of platinum, although much less oxidisable than lead or copper, are attacked very rapidly, and before the latter in the soda bath, by reason of their propensity to act as electro-negative elements. Hence, also, in an alloy very rich in lead the copper oxidises first. Another phenomenon of not less importance is that the solutions of the oxides in the soda bath act chemically in presence of the reagents exactly as do the metallic salts dissolved in water. It is thus in this igneous solution—all the metals are precipitated one after the other in the inverse order of their solubility; and in the direct order they preserve each other from oxidation. In this respect even insoluble reducing agents, such as charcoal, may be employed in the bath. The principal applications of the process are its adaptations, not only to the refining of lead and the extraction of silver by the zinc process from lead and argentiferous scoria, but the purification of argentiferous copper and old complex alloys; the treatment of ores of platinum, gold, silver &c., of ores of chromium, &c. Since March last the inventors have constructed a plant, and have carried on the process at Marseilles; and we learn that the hard leads of Greece (containing 2½ per cent. antimony, 1 per cent. arsenic, ½ per cent. copper, and 1 to 2 per cent. iron and sulphur), hard Spanish lead, and other forms of the metal containing large quantities of foreign substances have been successfully treated. A company has been formed for the fusion of ores, separation of metals, and refining by the processes of natro-metallurgy.

EXTRACTING SILVER FROM ITS ORES.—Mr. J. Douglass, Quebec, Canada, has patented a process of utilising the waste liquors of the ordinary ore-chloridising process, by allowing the insoluble matters contained in said liquors to precipitate, and then evaporating the clear supernatant liquid to obtain the soluble chlorides, which are re-applied in treating fresh ore. In an experiment recently made in a mill at Georgetown, Colorado, a filtered solution of salts, of 12° Baumé, contained 44·3·7 grains of saline matter in an ounce of solution, the chlorides being chiefly chloride of zinc and undecomposed chloride of sodium. This saline matter, mixed with ore in the proportion of 1 part of the salt to 8 parts of 80 oz. silver ore, chloridised it as perfectly as when 1 part of chloride of sodium was mixed with 10 parts of ore. In this mill each pan contains 75 gallons of liquor; and 35 pansful of this strong saline solution, or 2625 gallons, are thrown away daily, and with it 2051 lbs. of salts, almost as serviceable for chloridising fresh ore as chloride of sodium. This mill is now preparing to evaporate these waste liquors by means of the waste furnace heat, and the manager thus expects to save, at trifling cost, more than half the salt heretofore consumed.

THE INGERSOLL ROCK-DRILL.—This machine, which is at present attracting some attention in the United States, consists of a double-acting cylinder and piston, the piston-rod carrying the drill tool itself, which, as is usual in all machines of the kind, has an × cutting face. The cylinder is cushioned at each end just beyond the regular piston stroke, which effects a saving of air or steam, and prevents shocks very effectively, and when the drill is at work the motion of the machine is very slight even when delivering its hardest blows. The arrangements for feeding the drill are described as excellent; the forward movement of the tool is governed by the motion of the piston, and the latter never acts upon the feed until the rock is sufficiently penetrated for this purpose. From this it results that the feed is strictly automatic, and a steady progress at just the rate which the hardness of the rock and the pressure of the steam will permit is thus attained. It will be noticed that as the drill manages its own feed, and the rock controls its own hardness, there remains only the steam pressure within the control of the operator. Thus the management of the drill is reduced to the simple act of turning on more or less steam, and this, together with the simplicity which has been studied in the general design, makes it very easy to teach any man at all accustomed to machines how to work it. This simple mode of regulation by no means decreases the usefulness of the drill. No cut-off is used, but the full force of the steam is used through the whole stroke, as the makers have found by experience that much greater effectiveness is attained in this way. This arrangement permits the machine to work within very wide limits of force, so that it can be closely adapted to special conditions.

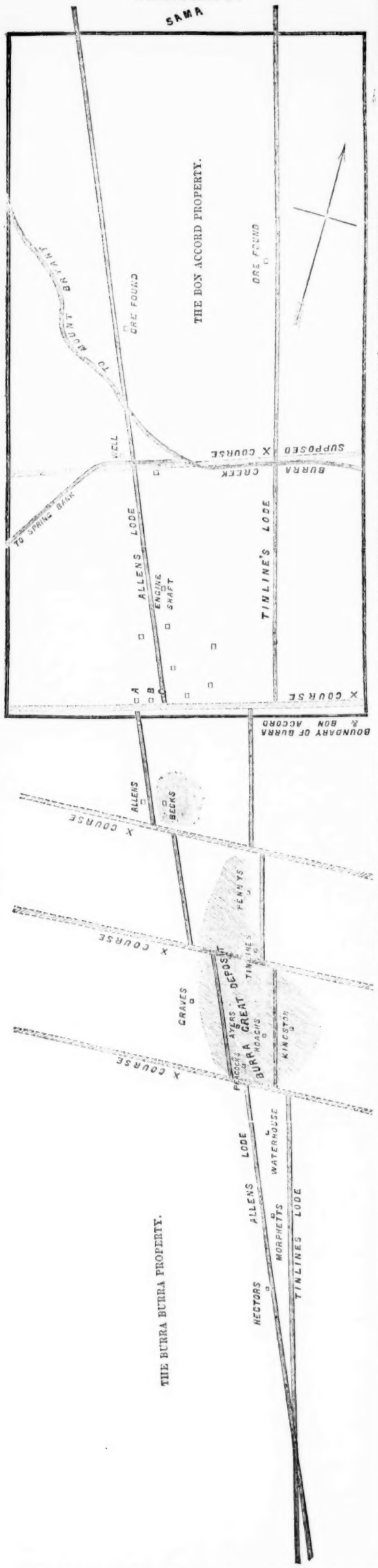
COATING METALS.—Messrs. C. CROWTHER and T. M. MORGAN, of Stour Valley Ironworks, Kidderminster, iron and tin-plate manufacturers, have patented an invention, the essential features of which consists in the use of a bath or pot for coating metals with metals, of a concave form inside, combined with a convex frame, which is inserted therein, such frame carrying rollers which lodge in a trough in the bottom of a bath or pot, which trough forms a support for the bath or pot on the brickwork. Both the exterior of the frame and the interior of the bath or pot are provided with ribs or projections, between which and through the bottom rollers and a pair of rollers disposed at the exit side of the baththproo the sheet being coated is passed.

BREAKFAST—EPPS'S COCOA—GRATEFUL AND COMFORTING.—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected cocoa, Mr. Epps has provided our breakfast tables with a delicately flavoured beverage which may save us many heavy doctors' bills."—*Civil Service Gazette.* Made simply with boiling water or milk. Each packet is labelled—"JAMES EPPS and Co., Homœopathic Chemists, London."

MANUFACTURE OF COCOA.—"We will now give an account of the process adopted by Messrs. James Epps and Co., manufacturers of dietetic articles, at their works in the Euston-road, London."—See article in *Cassell's Household Guide.*

THE VALUE OF SCIENCE in administering relief to human infirmities, and of knowledge of the right remedy, cannot be over-estimated. The source and centre of almost every ailment is impurity of the blood, thence dislodge the poisonous particles, and disease departs. Pure blood is the infallible remedy for weak lungs. Holloway's pills exercise the inestimable power of thoroughly cleansing each component part of the blood, and rendering this fluid fit to perform its important functions. They cope most successfully with chest diseases, stomach complaints, liver disorders, and many other maladies, which were once the besetting dangers of mankind at certain seasons in town or country. The directions for use enable everyone to regulate the operations of these pills with the greatest nicety.

THE YORKE PENINSULA MINING COMPANY.



Report on the Bon Accord property by Capt. Robert Sanders (with permission of the directors) of the Burra Burra Mine in South Australia:—

I have inspected the Bon Accord Mine, and herewith beg to submit my report. I presume I need not make an elaborate report by entering into the various details of surface appearance, and work done below, &c. Suffice it to state that the property is to the north of and adjoining the celebrated Burra Burra Mine.

By reference to the accompanying surface plan (which will illustrate my report) it will be perceived that the Burra contains two separate and distinct lodes, bearing about 30° and 20° west of north and east of south respectively; thus diverging going into the Bon Accord property. In the Burra these lodes are traversed by several cross-courses, causing intersections and dislocations, which are always desirable in a mining property, and are considered the "factors" of mineral veins. It is between these cross-courses or natural dams that the great deposits of ore were found in the Burra.

By a reference to former reports, and from information collected, I find that thirteen shafts (besides engine-shaft), varying from 7 fms. to 24 fms. deep, have been sunk on your property; nearly the whole of these have been sunk there in the ground between the two lodes. The engine-shaft has been sunk to a depth of 50 fms., and levels driven as follows:—At the 20 fm. level a cross-cut west 12 fms.; cut Allen's lode 12 ft. wide, and drove north and south on its course 64 fms. At the 40 a cross-cut west 10 fms.; cut Allen's lode 14 ft. wide (spots of ore); drove south 12 fms. At 50 cross-cut west 9 fms.; cut Allen's lode 14 ft. wide, drove north 9 fms., fine stones of ore. At the 20 cross-cut, 8 fms. east, cut large stream of water; took two 17-in. lifts going eight strokes per minute to fork it down. Instead of following the water coming in through this fissure (I believe the best indication of a lode ahead), a dam was put in the cross-cut to keep back the water, and there it stands to this day. Although the shaft was sunk to the 50, no cross-cut was driven east again fearing to cut the feed of water. If the divergence of the lodes continues, as seen at Burra, they would be 100 fms. apart at your engine-shaft. Allen's lode, 12 fms. to the west, and Tinline's lode, 88 fms. to the east of your engine-shaft. Tinline's lode (which we consider the main lode in the Burra) has not yet been seen in your property.

Looking at the configuration of the surface, the fact of the Burra engines keeping the water there to the 50 fathom level, yet in no way affecting the rise and fall of the water in your property, I consider a plain proof of the existence of intervening cross-courses. I am of opinion that a very strong course-course exists close to your south boundary, causing a lateral shift of the lode to the east of about 20 fathoms. This will account for not finding Allen's lode in your shaft A, in a line with the same lode in the Burra, and within 3 fathoms of the Burra boundary. Neither was it seen in your shaft B; but plainly seen (with good stones of ore in it) at your shaft C. This must be so, or a cross-cut 12 fathoms west from engine-shaft could not have cut it. I believe there also exists a very strong cross-course in the Burra creek, as when you were keeping the water at the 50 fathom level at your engine-shaft, the water stood in the shaft to the north of the creek in your property within 18 fathoms of the surface. I believe, also, that between these two cross-courses there has been a great deepening, or down throw, so that deposits of ore will not be found near the surface; but that to the north of the creek deposits of ore will be found at shallower depth.

Taking a view of your property in all its features and bearings in connection with the Burra lodes, and the fact of the existence of cross-courses traversing the same, I do not hesitate to affirm, as my firm belief, that you have all the features and elements of a profitable and lasting mine. I can, therefore, conscientiously recommend it as above ordinary speculations.

Should you be about to resume operations, I would suggest that 12 men be employed in costeening, six to the north of the creek to find the outcrop of the lodes, and six to the south of the creek to try to trace Tinline's lode from the Burra, in order to prove the relative position of lodes in your property to the lodes in the Burra. These facts ascertained, you could then see if the present engine-shaft be in a proper position, if not, a proper site could be selected for a new and permanent engine-shaft. This staff of men with supervision for 12 months would cost about 1600*l.* to 1700*l.* I believe this amount judiciously expended would show results and features that would justify you in extending operations. ROBERT SANDERS.

Burra Burra Mines, Dec. 23, 1873.

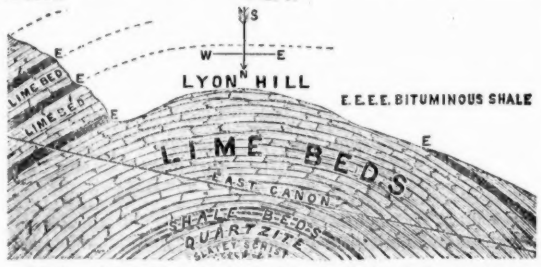
THE MINING INDUSTRY OF UTAH.

BED VEINS, STRATA VEINS, AND ORE BEDS—THE OPHIR, CAMP FLOYD, AND STAR DISTRICTS.

An interesting series of papers has been written by Prof. J. E. CLAYTON with reference to a class of ore deposits which he states are closely allied to bed veins and strata veins, but which cannot be properly called veins, because they are not continuous in the line of stratification, neither do they conform wholly with the beds of the country rock in which they are found. The term "ore beds" conveys the correct idea. They consist of masses of ore of irregular forms, and varying in extent, deposited in certain zones or belts of country rock, such as crystalline shales and schists, and also in shaley limestones, and more rarely on lines of contact between the azoic rocks and the sedimentary beds that overlie them.

A good illustration of this class of ore deposits can be seen near the town of Ophir in East Canyon, in Tooele county, Utah Territory. The upheaval of the Oquirrh Mountain range has produced at this point a most perfect and beautiful anticlinal curvature of the sedimentary beds. The longitudinal axis of the curve is nearly north and south. East Canyon has cut through it at right angles from east to west, thus exposing to view a succession of lime beds, aggregating a thickness of at least 1200 feet, rising from the bottom of the canyon (on the south side) in bold cliffs and narrow benches to the summit of Lyon Hill. This grand upward curve of the beds forming the hill has a base of about two miles wide, with a height at the centre of 1200 feet.

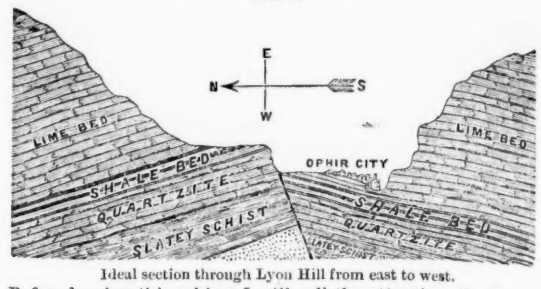
FIG. 1.



Ideal section, north to south, along longitudinal axis of the upheaval, showing a break across the anticlinal curve and dislocation of the beds, 1000 feet north of Ophir.

This anticlinal curvature has been broken across from east to west at a point about 800 ft. north of the canyon. This break also shows a fault or slip of the beds in a nearly vertical line of 200 to 300 feet. The country north of the line of fault has been raised at the center into a sharper curve than that portion south of it, thus producing a greater uplift of the beds at the centre, without materially disturbing their relative positions on the two flanks of the curve. The denudation of the country rock has been much more extensive on the north side of the canyon than south of it. A deep ravine on the north side has cut through the beds along the center of the upheaval, and enters the canyon at the town of Ophir. This ravine has exposed the quartzite and slatey schist that underlies the limestone formation at the point where it crosses the break, as shown in the longitudinal section. These quartzite and slatey schist beds belong to the Lower Silurian age, and are identical with those at Pioche, Schell Creek, Egan, Eureka, and other places in the State of Nevada. This is determined by the fossils found in the shaley beds lying between the quartzite and the overlying lime. The species recognised are Lingulas and Trilobites of primordial types. These Silurian shales or schists are much lower in the geological series than the shale beds of Dry Canyon, Camp Floyd, or Bingham Canyon, and have been subjected to very different chemical and mechanical influences. The pressure on them has been greater, and being *below* the lime deposits they have not been subjected to the same chemical agencies as those intercalated or interstratified with the later lime and quartzite beds. The Silurian shales are more crystalline in structure, are more fissile, and, consequently, more easily permeated by the heated vapours and gases in their ascent from the hot azoic rocks up towards the cooler and overlying zones. Under these conditions a well-defined contact vein between the quartzite and overlying shale could not be formed. The shale beds being partially crystallised and full of small cracks obstructed, but could not entirely arrest, the ascent of the metallic vapours and gases; hence the ore was deposited in irregular forms through the shaley beds—in some places as intercalated beds—and impregnations in the zones of shale that were most easily penetrated by the metallic solutions. The result is that the ore is found in irregular forms throughout the shaley strata, and in some places has passed through the slatey structure, and made important deposits in the limestone beds above the shale.

FIG. 2.



Ideal section through Lyon Hill from east to west.

Before leaving this subject I will call the attention of miners and engineers to one very significant fact in connection with ore deposits found in anticlinal curvatures of shale beds that are associated with lime and quarzite. The largest and most important deposits are found *at or near the summit of the curved strata*, thus proving the correctness of the theory that the metallic gases were driven *outward* by interior heat, and hence are found most abundant on the natural lines of escape towards the surface. The conclusion, therefore, is that the metals have been sweated or driven outwards from the lower and hotter towards the higher and cooler zones of country rock. Causes or principles never vary, but the conditions under which laws operate are never found precisely alike in any two localities; hence it follows that the same laws or causes produce widely different results under ever-varying conditions.

Referring to the Camp Floyd district, Prof. Clayton observes that it lies about 4 miles south of East Canyon and the town of Ophir. Lewiston is centrally located, as the mining town of the district, near the summit of the Oquirrh range. The ores found in this interesting locality are nearly all free milling, and, so far as present explorations show, they all belong, directly or indirectly, to a quartzite bed that overlies the older limestones composing the central mass of the great anticlinal upheaval that forms this portion of the Oquirrh range. The lower portion of this central mass of limestone with its underlying shale and quartzite beds belongs to the Silurian age. These older lime beds aggregate a thickness of 1000 to 1200 feet between the lower and upper beds of quartzite. At what point the Devonian and carboniferous beds commence is not definitely determined, but the probabilities are that the Silurian beds extend up to the quartzite bed, in which the ores of the district are found. These lower limestones are very compact and crystalline, generally of a dark grey colour, and showing but few fossils. Coralines and a few traces of mollusks are occasionally met with, but are too much changed by crystallisation to admit of an accurate determination of the species.

FIG. 3.

Ideal section across the Oquirrh range, Lewiston, Camp Floyd district.

The ore-bearing quartzite bed is of variable thickness—from 10 to 60 ft.—it has a hard limestone floor and a calcareous shale roof. The beds that overlie this ore-bearing quartzite are very different in structure and appearance from those below it; they consist of alternating beds of shale, sandstone, and cherty limestone. The shaley limestone are rich in fossils of Devonian and carboniferous types. As this silver-bearing zone of quartzite is somewhat anomalous in character, it is worthy of close examination and particular description. It does not show any characteristic features of a true vein structure, but does show the structure of a highly crystalline sandstone or quartzite. It is conformable to the bedding of the country rock throughout the district, the footwall or floor in all cases is dark limestone, and the roof or hanging-wall is calcareous or limestone shale. In many places it shows distinct lines of bedding like ordinary quartzite, and he thinks he may say that it does so in all places where it is exposed by denudation of the elements or by exploration, except in localities where the upheaval has crushed or brecciated the bed and obliterated the lines of bedding. These are facts easily determined by careful examination—he thinks he settled the question beyond dispute as to its proper classification. His conclusion is that it is a quartzite bed, and is as properly a part of the country rock as the lime below and the shale above it. The question may be asked, if this be true, why is it a silver-bearing rock? His answer is that it is a permeable stratum of sandstone made vitreous or crystalline by the heated vapours and chemical reagents that were driven up into it from below, before, or during the gradual upheaval of the anticlinal ridge. That the shale bed overlying it was *not* permeable stratum, hence the gases and mineralised vapours being confined to the porous and permeable stratum of sandstone, slowly changed it into a true quantzite, and deposited the ores of silver, antimony, and copper. The richest deposits of ore are invariably found in it where the quartzite is most broken and crushed by the upheaval. These points being so much broken, made its penetration by the mineral solutions less difficult, thus insuring a more abundant deposit of ore. A close examination of the ore deposited in the crushed or broken quartzite will show that the ore is deposited mainly on the surface of the fragments, the interior being more or less barren of ore. This would seem to indicate that the ore continued to be deposited long after the stratum was broken and crushed by the upheaval. In the light of these facts this should be classed as an "impregnated bed," or deposits of ore by impregnation while in a soluble state.

The commercial value of all deposits of this class must depend upon the amount of the metals contained in a given quantity, and this rule applies to all classes of veins and deposits that are metal-bearing. I can see no reason why impregnated beds should not be as rich, extensive, and valuable as any other class of deposits. Copper and other ores of the base metals are often found as impregnations in schists and slates in various parts of the world. Gold is found in North Carolina, Georgia, Alabama, and California in belts of slate that are thoroughly impregnated with iron, copper, zinc, and lead sulphurets. They are called metal bearing belts or zones of country rock, and are not classed as veins or lodes. There is no royal road to mineral wealth. In whatever position you find ore, the measure of values must be quantity, and the percentage of metal contained in it. If your deposit contains plenty of rich ore is not necessary to cavil about its form. There is an old proverb that it is not good manners to "look a gift horse in the mouth," or ask the giver how old he is.

Star district, to which Prof. Clayton next alludes, is situated in the Picacho mountains, a low and somewhat isolated range lying in the south-eastern edge of the great desert of Utah and Nevada. The town of Minersville, 15 miles south-east of the district, is the nearest agricultural settlement. This settlement and Star district are in Beaver county, Utah Territory, about 220 miles south-south-west from Salt Lake City, and close on the line of travel from that city to Pioche in south-eastern Nevada. The geological structure of the Picacho range is made up of belts or zones of ironstone, quartzite, and metamorphic shales, flanked on both sides by igneous

rocks such as porphyry, trap, and lava outflows, common to the interior ranges of the great basin or desert between the Wassatch and Sierra Nevada Mountains. The metamorphic action on the shale, limestone, and quartzite beds has been much more intense and well marked along the flanks of the range than in the central zones. The general strike or course of the beds is north and south, the dip is to the east, at angles varying from 40° to 60° below the horizon. His examinations were confined to that portion of the district called North Camp, and across the north end of the mountain from the east to the west side. North Camp, or Shenandoah, as it is sometimes called, is situated on the east flank of the mountain facing Beaver Valley. The principal mines examined were the Shenandoah, the Midas, the Washington, the Matilda, the Monitor, the Sherman, the Lindsey, the Empire, the Old Hickory, the Merrimac, Rebel, and Hidden Treasure. All these mines except two are situated in a belt or zone of magnesian limestone of 600 to 800 ft. in width, that extends along the lower flank of the mountain, as shown in the plan and section. It is really situated in the low eastern foothills of the range. This belt of magnesian limestone, or dolomite, as it is sometimes called, is the principal metal-bearing country rock on the east side of the mountain—that is to say, the veins and ore deposits are more numerous in this belt than they are in the schists, quartzites, or porphyries.

FIG. 4.

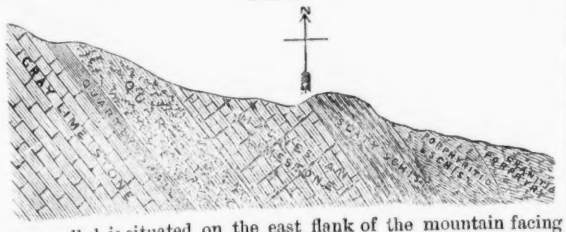
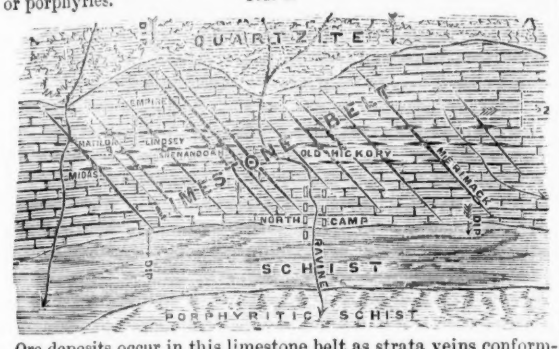


FIG. 5.



Ore deposits occur in this limestone belt as strata veins conforming to the strike and dip of the beds, and as gash veins, or fissures, crossing the beds from south-west to north-east, as shown in the plan. The strata veins show themselves only along the central portions of the belt of limestone, their course being the same as the beds, from north to south, and dip east. The gash veins or fissures, have a south-west by north-east course, and dip towards the north-west at angles varying from 50° to 70°. It will thus be seen that they cross the beds obliquely on the horizontal plane, but nearly at right angles through them on their line of dip, as shown in the transverse section. The cross fissures, or gash veins appear to be continuous through the lime beds from the quartzite on the west, to the slaty schist on the east side. He was not able to trace any one of them beyond the limits of the lime beds, except one in the northern part of the belt called the Merrimac; this vein fissure can be plainly traced several hundred feet into the calcareous slaty schist east of the lime belt. There is also some evidence at one or two points that vein fissures do penetrate into the quartzite on the east side of the lime belt, but from the partial explorations made he could not determine the fact as to their identity with those in the limestone. The gash veins occur at intervals along the course of the lime beds varying from 20 to 3000 ft. apart; but all approximately parallel in course and dip, showing that they belong to a distinct system or group of fissures of common origin and contemporaneous age. The veins are, as a rule, small, varying in thickness from 1 to 3 or 4 ft. At the points where they cross the strata vein deposits they show a tendency to enlarge and form important chambers of ore, such as those in the Hickery and Shenandoah Mines.

The deposits that are found conformable with the strike and dip of the lime beds are not sufficiently continuous and well defined to enable him to say positively that they are true strata veins. It is quite possible that they are nothing more than spurs or offshoots from the gash veins. They carry ores of the same class, and appear to have been formed contemporaneously, and as there is no distinct cutting of one class of deposits by the other, the filling must have been done in both systems of fissures at the same time.

The gangue, or veinstone, is a true vein quartz, some of it hard and compact, and other portions quite porous, or spongy, sometimes called by the miners honeycomb quartz. The ores contained are silver, lead, copper, and perhaps some antimony, combined with sulphur. The surface ores show true chloride of silver, and carbonates of lead and copper, in combination with the sulphides of those metals. It cannot be classed as a free milling ore, owing to the large per centage of the base metal ores; but the larger part of it can be milled by crushing it dry, and passing it through a Stetefeldt or other chloridising furnace. From a large number of samples taken from the mines in the lime belt the assays ranged from $37·90 in silver up to $325·42 per ton. The average, assay value, as near as he could estimate from the samples taken as $60 to $80 per ton in silver. Owing to the hard siliceous character of the limestone country rock, inclosing the veins, the mining expenses will be large. The veins are generally small, and a portion of the walls must be removed in order to give room to work in. Estimating the dead work necessary to keep the mines open ahead of the extraction of ore, and the amount of waste rock to be removed, the average cost of mining per ton of ore will not be less than $15 per ton. Hauling, milling, roasting, and reduction by amalgamation will cost, under the best management, $20 per ton, making the total cost of mining and reduction about $35 per ton. Allowing 20 per cent. loss in reduction, this would leave a net profit per ton of about $25.

The whole group of mines above described are capable of giving a constant supply of ore for a first-class 20-stamp mill—say, 25 to 30 tons per day continuously.

Outside of the mines in the lime-belt, and a few locations in the quartzite, a large majority of the ore deposits in the district, are properly classed as smelting ores. At least two-thirds of the ores of the district are better suited for reduction in the smelting furnaces than by stamp mills.

The Rebel, Hidden Treasure, and numerous other locations, show fair quantities of good smelting ore, such as galena and carbonate, mixed with the oxides of iron and manganese. Some of these lead ores are very rich in silver, ranging from 30 to 200 ozs. to the ton of ore. The mines that I examined in the northern part of the district can be made to supply about 50 tons of good smelting ore per day, that will give 30 to 50 per cent. of lead, and 50 ozs. of silver per ton of ore.

His examinations were made more than a year ago, and were confined to the north end of the district; since his visit there have been many new discoveries made, and some additional explorations on the mines that he examined. Taking the district as a whole, he thinks it will prove to be a valuable one, and destined in the future to add largely to the wealth of the Territory. The immediate want is the extension of the railroad south, to some point at or near the district, so that mining machinery and supplies can be obtained cheaply, and enable the miner to ship his lead bars to market at a reasonable cost.

His object in writing this description of the Star district is to give some general idea of the geological structure of the district, and the mode of occurrence of some of the leading or characteristic mines, especially those mines that occur in the dolomite, as "strata" and "gash" veins. They represent an interesting class of ore deposits, and, therefore, deserve particular description.

LOCOMOTIVE TANK ENGINES

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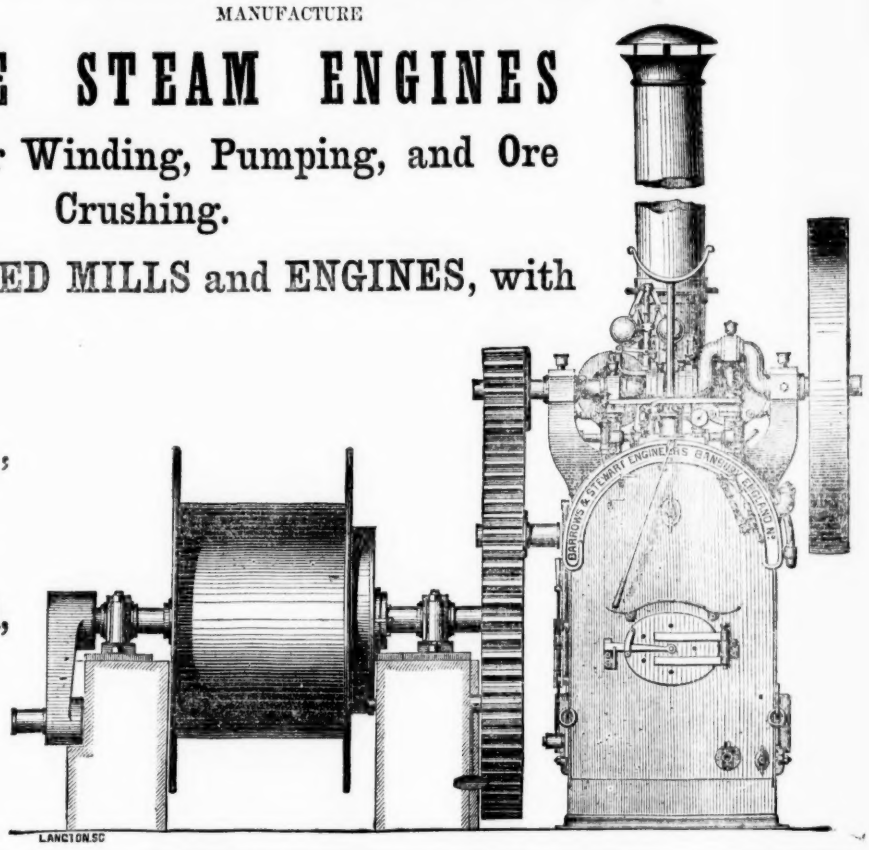

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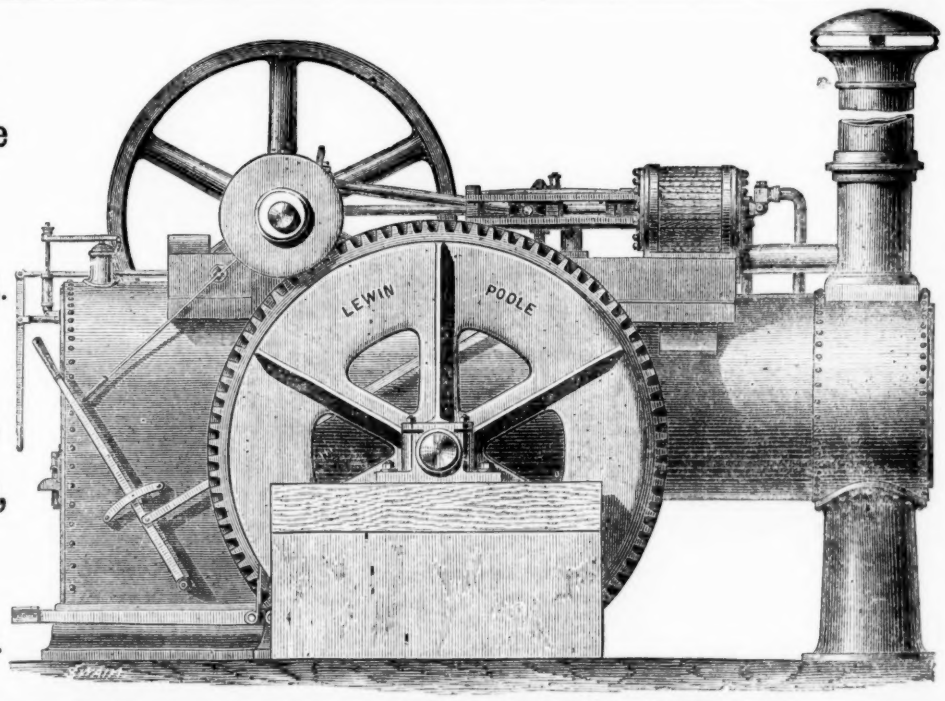

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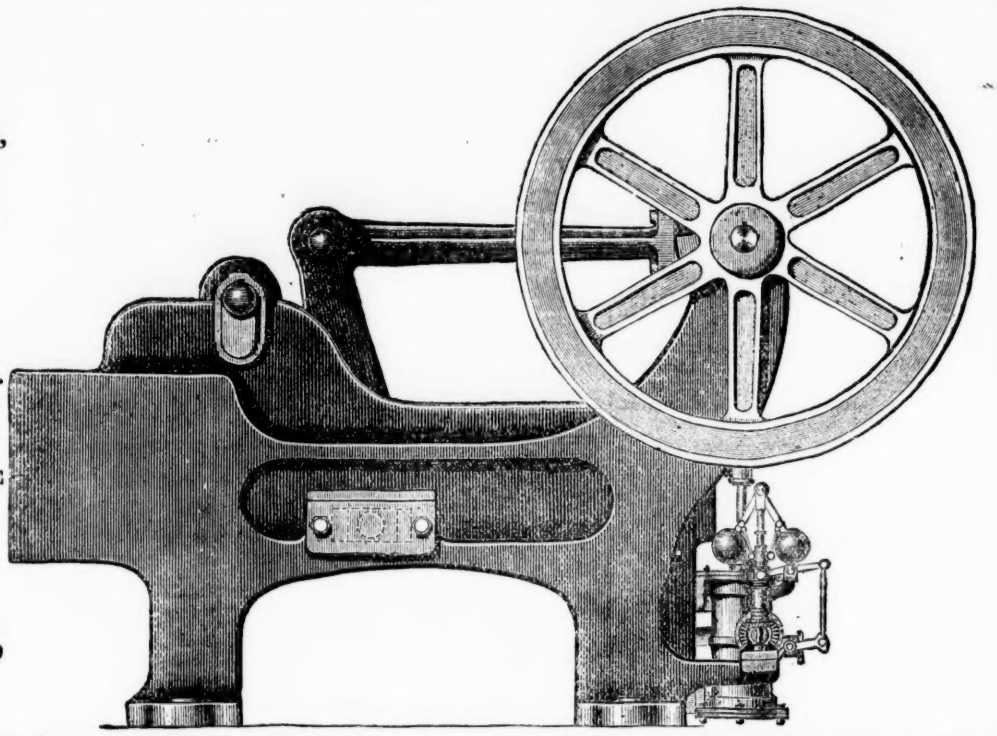

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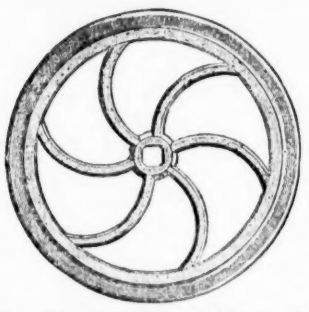

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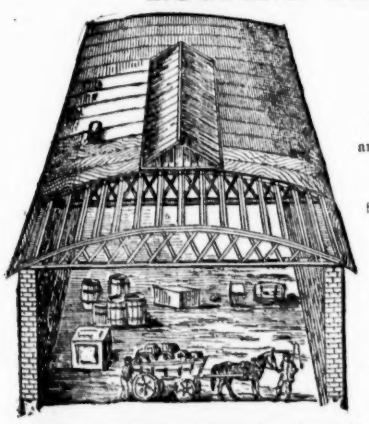

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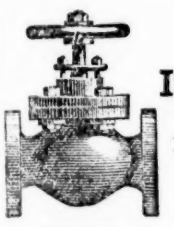

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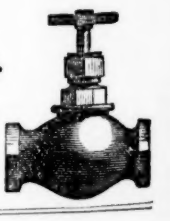

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